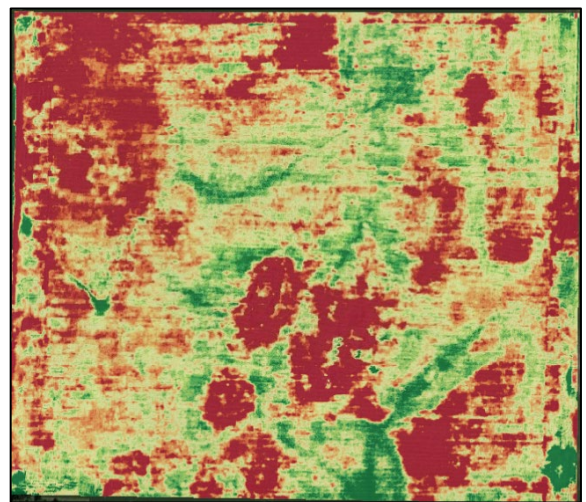


Purdue Extension/Wabash Heartland Innovation Network



On-Farm Demonstrations



2021

Purdue University Cooperative Extension Service/Wabash Heartland Innovation Network On-Farm Demonstrations Purpose:

- This report covers demonstrations conducted primarily in the Wabash Heartland Innovation Network (WHIN) region of Indiana consisting of Tippecanoe County and the surrounding counties. Some additional work was done throughout central Indiana.
- It is important to know that this is not typical University grade research. All demonstrations have only been conducted one year and have not been evaluated statistically; therefore, this information should be regarded as anecdotal in nature only and may not return similar results in future years.
- Our goal with this project was to create farmer-driven demonstrations where the producers made the decisions on what to test, how to test it, and each had their own reasons for why. Each demonstration was unique in some way to each producer and Extension was there to provide support, information gathering, and use what was learned for educational purposes. This report is intended to allow producers to see what others are thinking about and testing across the region and state.

- All material presented is for educational purposes only. All information is anecdotal and has not been repeated or statistically analyzed unless noted. Any product stated was selected by a producer without any input from an Educator and presenting results from product here is not an endorsement.

Acknowledgements

Purdue Agriculture-WHIN Team: Dr. Jason Henderson, Dr. Dennis Buckmaster, Dr. Bruce Erickson, Dr. Somali Chaterji, and Andrew Balmos for funding support.

Purdue Extension Digital Agriculture Coordinator: John Scott

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Carroll County Agriculture and Natural Resource Educator: Kelsey Holt

Clinton County Agriculture and Natural Resource Educator: Adam Shanks

Tipton County Agriculture and Natural Resource Educator: Austin Pearson

Thank you to all our producers who participated in this pilot project in Montgomery, Boone, Clinton, Carroll, and Tipton counties by allowing us to engage on their farm operations and gather this information to share with others.

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Different Manure Sources Spring applied to Corn

Objective:

This demonstration was to observe different manure applications and mid-season y-drop UAN application on corn. The goal was to observe how different manure types and mid-season rates impacted plant health and yield.

Demonstration Details			
	Chicken Litter / Swine Manure & 10 lbs Y Drop (CL/SM10)	Chicken Litter / Swine Manure & 30 lbs Y Drop (CL/SM10)	Chicken Litter & 80 lbs Y Drop (CL80)
Previous Crop	Soybean		
Tillage	Fall ripping, Spring cultivation		
Planting Date	4-27-2021		
Planting Population	34,000 seeds/acre		
Row Spacing	30 inches		
Planting Equipment	Planter		
Relative Maturity	111		
Harvest Date	10-7-2021		
Starter	Yes		
Chicken Litter Rate	2 Tons / acre		
Y Drop Fertilizer	28-0-0 UAN, AMS		
Swine Manure Rate	56 gallon/acre		
Average Yield (bu/ac)*	223		
UAV Flight dates: 6-11, 6-19, 6-28, 7-12, 7-26, 8-10, 8-23, 9-8			
Tissue Samples: 6-15, 6-28, 7-12, 7-26, 8-10, 8-23, 9-8			
Plant Evaluation: 6-11, 6-19, 7-12, 7-26, 8-12			

Observations:

Treatment blocks:

CL/SM10: Chicken Litter/ Swine Manure & 10 lbs Y Drop

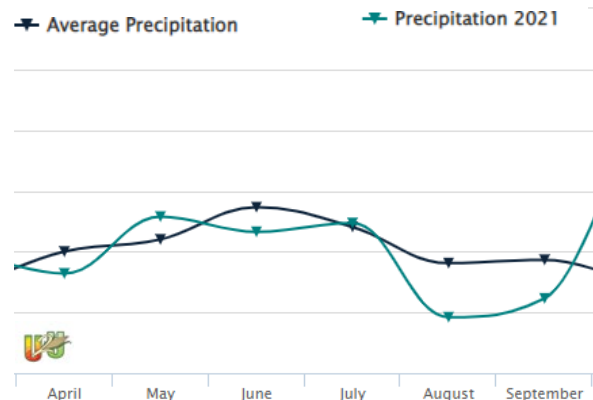
CL/SM30: Chicken Litter/ Swine Manure & 30 lbs Y Drop

CL80: Chicken Litter & 80 lbs Y Drop



Weather: Precipitation

The beginning through mid-growing season tended to be about average with May slightly wetter, June slightly drier, and July on trend. Late July through September was much drier than normal and occurred during seed fill.



UAV Imagery:

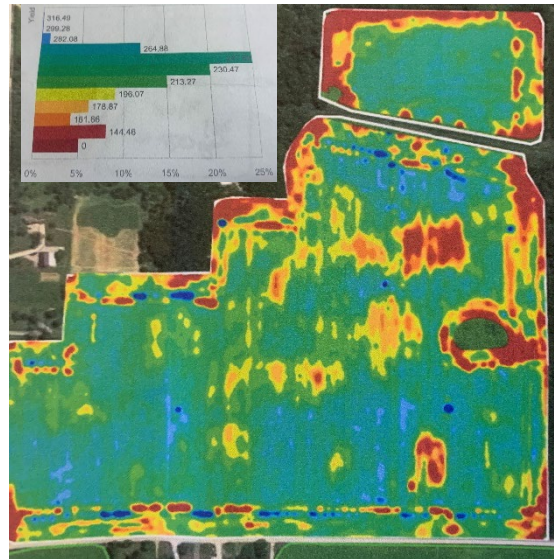
This RGB orthomosaic map shows the field on 7-26, after the Y-drop application. It is possible to see a block in the center of the map that corresponds with the CL/SM 30 treatment.

The arrows indicate the edges of the block.



Yield:

The yield map showed no difference regardless of treatment with lower yielding areas showing as little to no crop in the aerial imagery. Most yield variation was likely due to topographical/soil/ and weather. It was also noted that areas of low yield on the right side of the map as pictured was due to severe deer feeding and damage.



Summary:

This year in this location there was no yield advantage to late season fertility or higher fertility rates. Given the dryer conditions during seed fill it is possible that the nitrogen applied late was unable to be used by the crop.

Point of Contact: John Scott; Digital Agriculture Coordinator / Kelsey Holt; Carroll County ANR Educator

Nitrogen (N) Timing and Source

Objective:

This demonstration was completed in conjunction with the Soil and Water Conservation District and Indiana INFIELD Advantage program to evaluate yield effects of different N application timing and sources.

Demonstration Details

	Block 1	Block 2	Block 3
Initial Treatment	2x2 @ 10 lbsN: 10-34-0 with ATS	Pre-plant broadcast Urea and ESN*	Pre-plant broadcast Urea**
Second Treatment	28% UAN sidedress	None	broadcast ESN**
Nitrogen Rate	180 lbs / acre		
Previous Crop	Soybean		
Tillage	Spring Field Cultivator after fertilization to incorporate		
Planting Date	5-1-2021		
Row Spacing	30 inches		
Planting Equipment	Planter		
Harvest Date	11-3		
Average Yield (bu/ac)*	236	233	237

UAV Flight dates: 6-26, 7-26

* Plot 2 concentration was 35% Urea and 65% ESN

** Plot 3 concentration was 50% Urea and 50% ESN

Notes:

Herbicide, insecticide, and fungicide was applied to this field over the growing season.

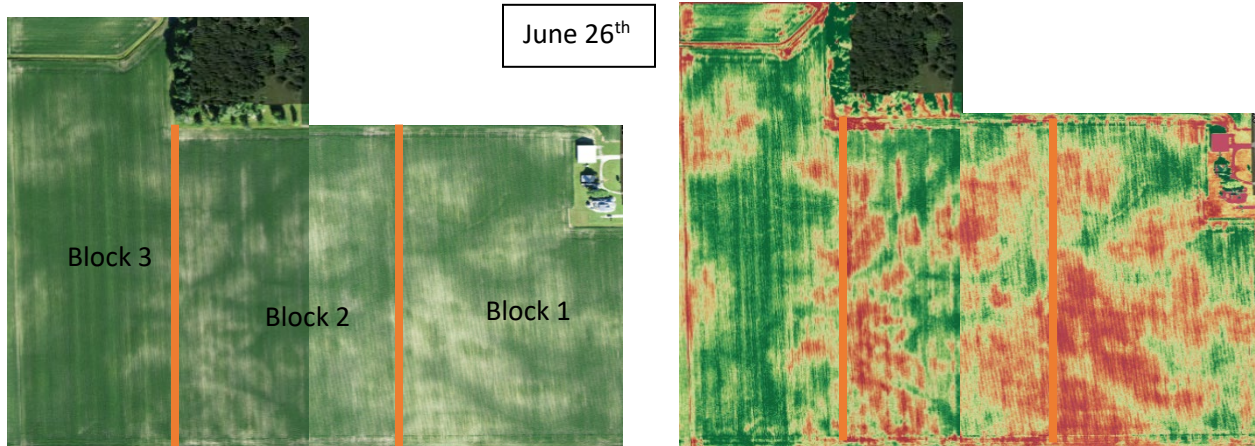
Treatment blocks:



Observations:

All plots were flown in late June and July. Each map required 2 flights (the line in the middle of the map shows the break).

In June, soil and landscape differences were still apparent especially in block 1 and 2. Block 3 had greater canopy coverage and variation was less prominent, likely due to soil uniformity.



In July, block 1 is the most uniform and light-colored streaks start showing up in blocks 2 and 3. This indicates that only early season N or a reduced rate in season may not deliver sufficient nutrients to the plants. Likewise, it shows that a later season application at a higher rate will sustain the plant through its growth cycle, resulting in a healthier plant and potentially higher yields.



Summary:

Throughout these images you can see variability in soil types. You can also see early nitrogen benefits, but then see where it runs out late versus the side-dress that provides nitrogen longer through the season. Yields were very close likely due to weather conditions during the seed fill window being dry.

Point of Contact: Adam Shanks; Clinton County ANR Educator

Spring Swine Manure & High Yield Attempt on Corn

Objective:

This demonstration occurred in a high yield management plot where the producer was looking at spring swine manure, 2x2, and other management strategies.

Demonstration Details

	2x2 Treatment	Untreated
Previous Crop	Soybean	
Tillage	Conservation Tillage	
Planting Date	6-1-2021	
Planting Population	36,000 seeds/ac	
Row Spacing	30"	
Planting Equipment	Planter	
Relative Maturity	109	
Harvest Date	11-1-2021	
Starter	Yes	No
Average Yield (bu/ac)*	230	230
Starter: 10-34-0, Pivot Bio Proven® 40		
UAV Flight dates: 7-19, 9-8		
Tissue Samples: 6-30, 7-14, 7-28, 8-12, 8-25, 9-10		
Plant Evaluation: 6-28, 9-8		

Notes:

Excessive soil moisture early through half way through the growing season, then dried off.

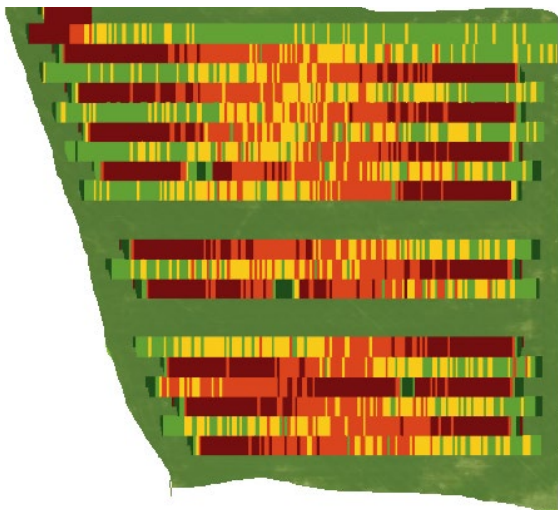
Visual differences on the ground were not observed throughout the growing season. Crown rot was present at the time of harvest, and it is undermined if that is a result of spring planting conditions or something with the manure.

*Producer reported

Observations:

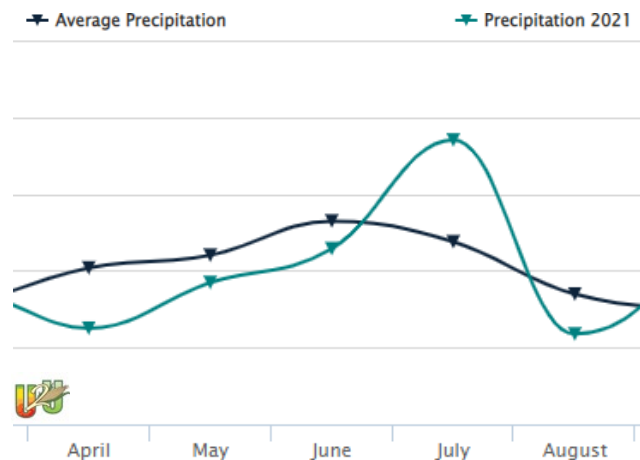
Treatment Blocks

Starter and Pivot Bio were applied to the field. Two random strips were used where the planter went 48 rows with the Pivot Bio shut off. Starter rate was increased in the areas where Pivot was not applied.

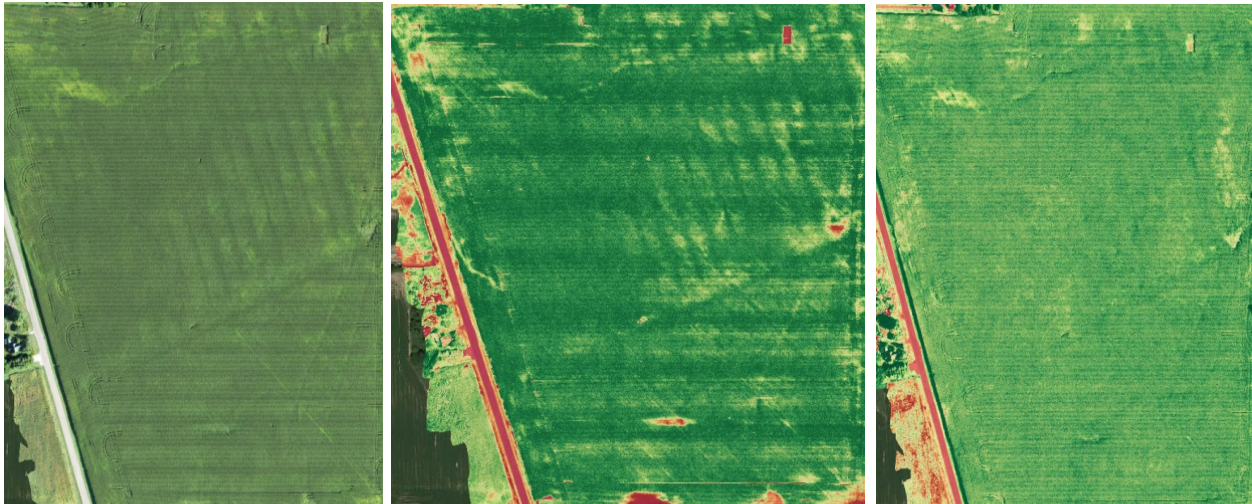


Weather

The weather trend for this field showed slightly dryer than average in the early season, much wetter in July, and dryer again in August.



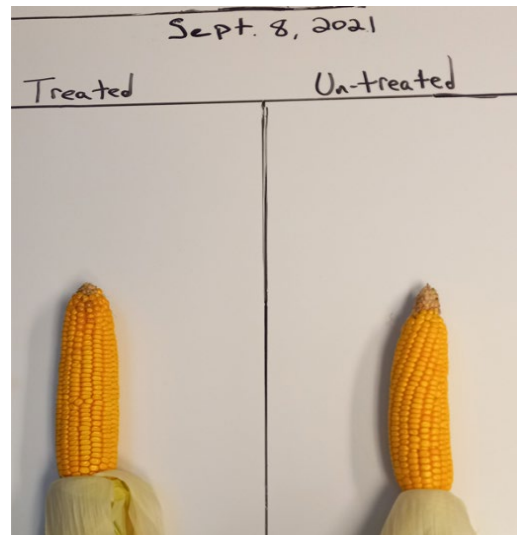
UAV Imagery:



The series of maps shows the RGB and VARI from July 19 and the VARI from September 8. In the July maps it is possible to see the tile system and there is some striping in the VARI which may be showing treatment effect but it seems more likely to be an image stitching error. By September there is no striping and the field is a uniform green.

Ear Check:

Ear samples were collected on 9-8 and evaluated. The ear from the treated and untreated areas were very similar in length and girth.



Summary:

This demonstration was an attempt to reach high yields with high management of nutrient application timing and sources. Spring applied swine manure, starter fertilizer, biologicals, micro nutrients, and fungicide were all managed on this demonstration. No yield difference was observed between the treated and untreated strips. In this single trial for this single year, all the treatments did not add economic value when comparing the cost to the bushels increased.

Point of Contact: Adam Shanks; Clinton County ANR Educator

Spring Swine Manure and 2x2 on Corn

Objective:

This demonstration looked at spring applied as opposed to fall applied swine manure and compared strips receiving 2x2 or not receiving 2x2 at planting. The goal was to evaluate if manure timing and 2x2 had any interaction both with and without 2x2 and spring compared to fall applied manure.

Demonstration Details

	2x2 Treatment	Untreated
Previous Crop	Soybean	
Tillage	Conservation Tillage	
Planting Date	6-1-2021	
Planting Population	36,000 seeds/ac	
Row Spacing	30"	
Planting Equipment	Planter	
Relative Maturity	109	
Harvest Date	10-19-2021	
Starter	Yes	No
Average Yield (bu/ac)*	228	227
Starter: 10-34-0, Pivot Bio Proven® 40		
UAV Flight dates: 7-19, 8-31		
Tissue Samples: 6-30, 7-14, 7-28, 8-12, 8-25, 9-10		
Plant Evaluation: 6-28, 8-31		

*Producer reported

Notes:

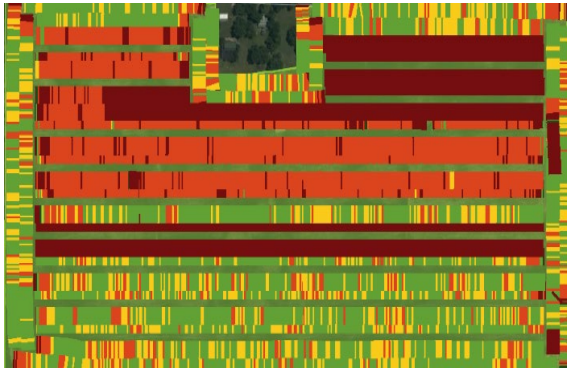
Thick stand of corn, good emergence. Lots of moisture early then drying off later.

Visually the untreated didn't have the vigor that the treated seemed to have. Tissue tests however, did not indicate any real significant different in tissue nutrient reading from the different areas.

Observations:

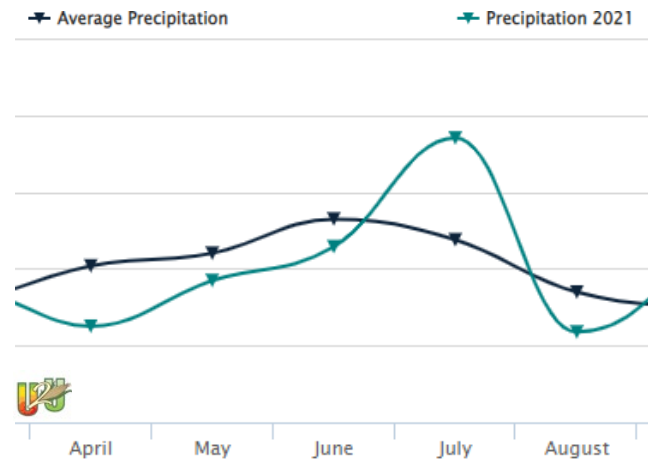
Treatment Blocks

The treatments were laid out in blocks of 48 rows across the field. This was a matter of turning the treatment on or off from the tractor cab to establish the treated and untreated blocks.

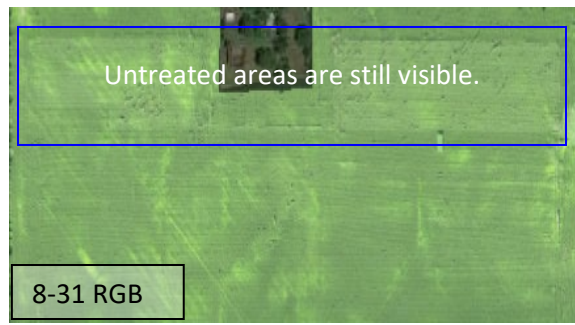
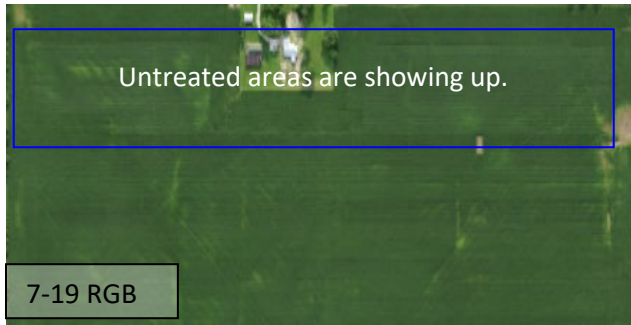


Weather

The weather trend for this field showed slightly dryer than average in the early season, much wetter in July, and dryer again in August.



UAV Imagery:



Flights occurred on 7-19 and 8-31. In both flights it is possible to see the untreated block throughout the field. It appears that the lodging is worse in the untreated areas than in the treated area in the 8-31 RGB map. (Lodging is shown by the areas that look like holes in the map, not differences in color.)



Scouting:

While scouting this field (both walking and with the UAV), the Tar Spot and lodging was located. The farmer was notified of these issues and advised to move this field up in the harvest order.



Tar Spot



Lodging



Summary:

This demonstration showed that starter applied at planting can have no positive affect on yield when swine manure has been applied in the same spring. Crown rot was again an issue in this field and it is unclear if that is a result of the swine manure or planting conditions. There was essentially no yield difference between the treated and untreated blocks. This demonstration points toward a cost savings of not applying starter if swine manure was applied in the same spring.

Point of Contact: Adam Shanks; Clinton County ANR Educator

Fall Swine Manure and 2x2 on Corn (Demo 1)

Objective:

This demonstration looked at fall applied as opposed to spring applied swine manure and compared strips receiving 2x2 or not receiving 2x2 at planting. The goal was to evaluate if manure timing and 2x2 had any interaction both with and without 2x2 and spring compared to fall applied manure.

Demonstration Details

	2x2 Treatment	Untreated
Previous Crop	Soybeans	
Tillage	Conservation Tillage	
Planting Date	5-16-2021	
Planting Population	42K Seeds/Acre	
Row Spacing	30"	
Planting Equipment	Planter	
Relative Maturity	115	
Harvest Date	10-18-2021	
Starter	Yes	No
Average Yield (bu/ac)*	230	220
Starter: 10-34-0, Pivot Bio Proven® 40		
UAV Flight dates: 6-24, 7-26, 9-8		
Tissue Samples: 6-30, 7-14, 7-28, 8-12, 8-25, 9-10		
Plant Evaluation: 6-28, 9-8		

Notes:

This demonstration field looked great on the ground all year. The UAV imagery showed some weak areas along a ridge and a field edge that is mostly sandy loam soil.

Tissue samples and visual differences between the treated and untreated areas were not observed. Early indications would show no yield difference between demonstration areas.

*Producer reported

Observations:

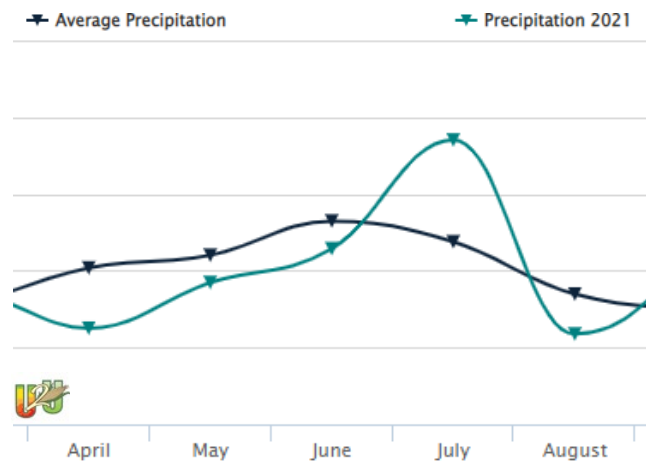
Treatment Blocks

The treatments were laid out in blocks of 48 rows across the field. This was a matter of turning the treat on or off from the tractor cab

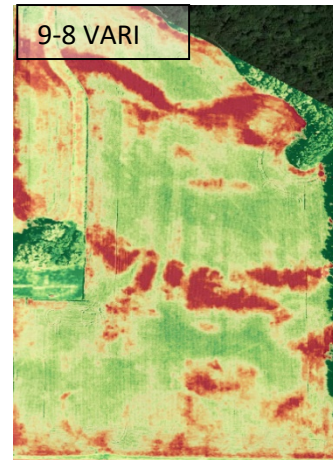
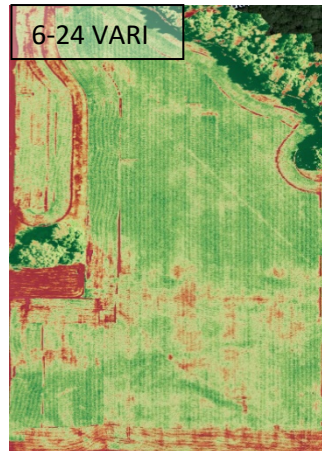


Weather

The weather trend for this field showed slightly dryer than average in the early season, much wetter in July, and dryer again in August.



UAV Imagery:



Ear Check:

Ear samples were collected on 9-8 and evaluated. The ear from the treated and untreated areas were very similar in length and girth.



Summary:

This demonstration did show an average of 10 bu/ac advantage of adding starter fertilizer at planting to corn that had swine manure applied the previous fall.

Point of Contact: Adam Shanks; Clinton County ANR Educator

Fall Swine Manure and 2x2 on Corn (Demo 2)

Objective:

This demonstration looked at fall applied as opposed to spring applied swine manure and compared strips receiving 2x2 or not receiving 2x2 at planting. The goal was to evaluate if manure timing and 2x2 had any interaction both with and without 2x2 and spring compared to fall applied manure.

Demonstration Details

	2x2 Treatment	Untreated
Previous Crop	Soybeans	
Tillage	Conservation Tillage	
Planting Date	5-22-2021	
Planting Population	36K Seeds/Acre	
Row Spacing	30"	
Planting Equipment	Planter	
Relative Maturity	107	
Harvest Date	11-6-2021	
Starter	Yes	No
Average Yield (bu/ac)*	240	230
Starter: 10-34-0, Pivot Bio Proven® 40		
UAV Flight dates: 6-24, 7-23, 9-8		
Tissue Samples: 6-30, 7-14, 7-28, 8-12, 8-25, 9-10		
Plant Evaluation: 6-28, 9-8		

*Producer reported

Notes:

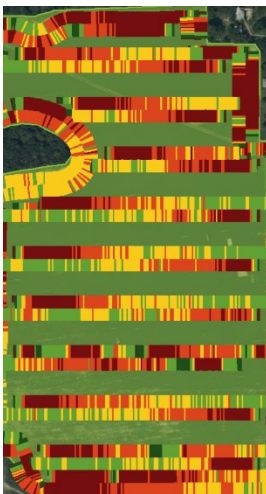
Thick stand of corn with good emergence. Saturated soils early then drying off later in the season.

Tissue samples and visual differences between the treated and untreated areas were not observed. Early indications would show no yield difference between demonstration areas.

Observations:

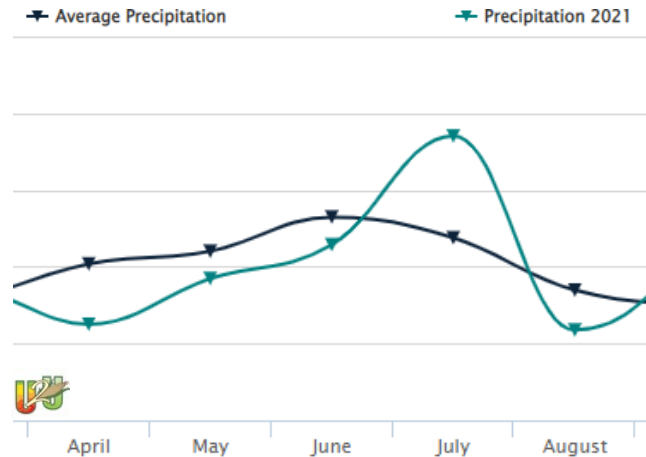
Treatment Blocks

The treatments were laid out in blocks of 48 rows across the field. This was a matter of turning the treat on or off from the tractor cab to establish the treated and untreated blocks

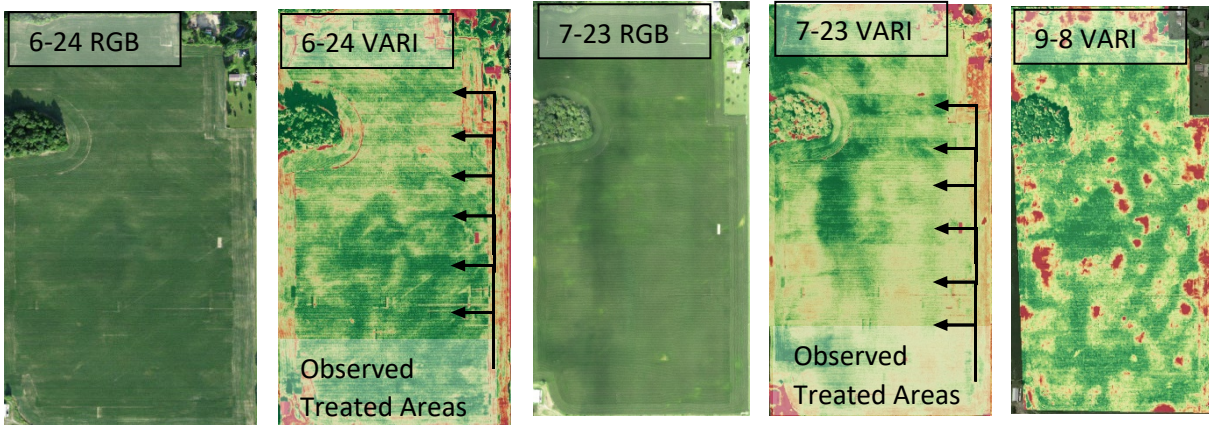


Weather

The weather trend for this field showed slightly dryer than average in the early season, much wetter in July, and dryer again in August.



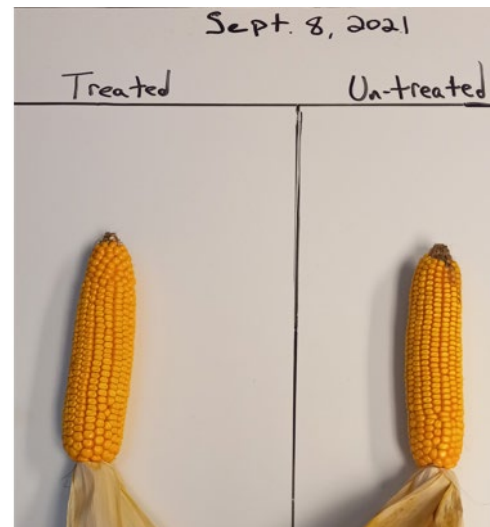
UAV Imagery:



This series of maps shows striping across the fields following the treatment pattern. This is especially prevalent in the VARI maps for late June, less prevalent in late July, and by early September there is no obvious pattern. This may indicate that the treatment benefited growth and plant health throughout the majority of the growing season but toward the end of grain fill everything matured about the same rate.

Ear Check:

Ear samples were collected on 9-8 and evaluated. The ear from the treated and untreated areas were very similar in length and girth.



Summary:

This demonstration did show an average of 10 bu/ac advantage of adding starter fertilizer at planting to corn that had swine manure applied the previous fall.

Overall Swine Manure Summary:

Overall starter fertilizer on spring applied manure had no advantage but on fall applied manure there was around a 10 bushel advantage consistently across populations and locations.

Point of Contact: Adam Shanks; Clinton County ANR Educator

Different Manure Sources Spring applied to Corn (Demo 1)

Objective:

The producer treated two corn fields with three rates of chicken litter (CL) (0.5 T, 1 T, and 3 T). UAV flights and yield checks were conducted to check status of the crop. Field history and application details can be seen in the table and image below.

Demonstration Details

	CL Rate 1	CL Rate 2	CL Rate 3
Previous Crop	Soybeans		
Litter Application	Broadcast		
Tillage	Conventional		
Planting Date	4-26-2021		
Planting Population	36,000 seeds/acre		
Row Spacing	30 in		
Planting Equipment	Deere 1770NT		
Relative Maturity	117		
Starter	20 gal		
Other Fertilizer	Anhydrous		
Harvest Date	9-21-2021	9-27-2021	10-2-2021
Litter ton/ac	1.5	0	1.0
Average Yield (bu/ac)*	277.4	277.9	277.1

Flight Dates: June 14, July 6, 28

Yield Estimate Date: August 12

*Producer reported

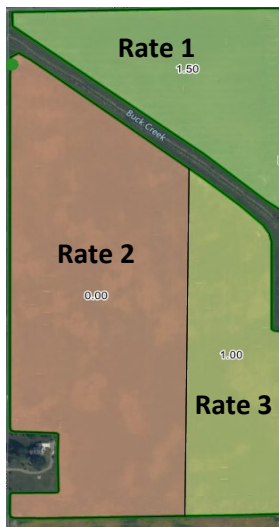
Observations:

Treatment Blocks

Rate 1: 1.5 Ton/ac Layer litter

Rate 2: 0 Ton/ac Layer litter

Rate 3: 1 Ton/ac Layer litter

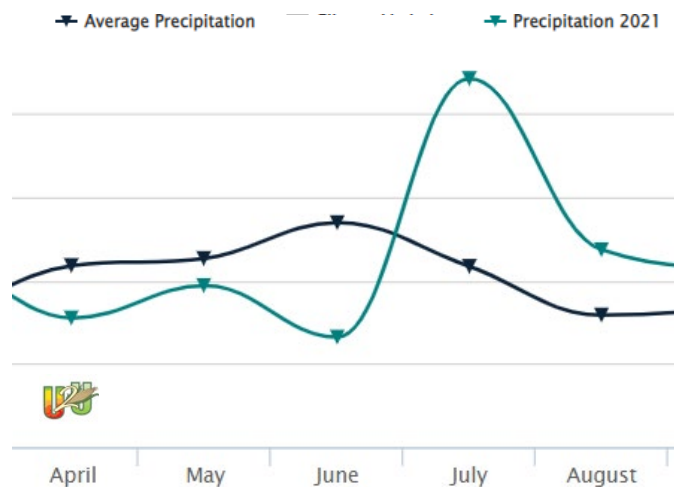


UAV

Imagery

Weather

The weather trend for this field showed slightly dryer than average in the early season, much wetter in July, and dryer again in August.





Three flights were conducted through June and July. Early season flights indicated soil impacts on crop establishment. Planter skips (yellow circle) and bare spots (red circle) were visible throughout the entire growing season. Temporary surface storage of the chicken litter occurred in the northern, red circle. Additionally, a light green strip can be seen in the aerial imagery throughout the entire growing season. This is attributed to a nutrient application issue (possible ran out of starter fertilizer). In the imagery, treatment differences could not be teased out.

Yield Estimates:

Yield estimates were taken from each of the rates. Estimates ranged (two different Kernel factors) as follows: Rate 1 – 247.2 to 280.2, Rate 2 – 250.9 to 284.3, and Rate 3 – 245.5 to 278.2.

Average-Large Kernel (Factor 85)			Large Kernel (Factor 75)		
Rate 1	Rate 2	Rate 3	Rate 1	Rate 2	Rate 3
AVG	AVG	AVG	AVG	AVG	AVG
247.2	250.9	245.4	280.2	284.3	278.2
Field AVG	247.8		Field AVG	280.9	

Summary:

Chicken litter rates (0.5 T, 1 T, and 3T) were applied three rates. Other agronomic management practices were the same. Aerial imagery could not detect differences in the treatment rates as they all appear uniform. This is consistent with yield estimates collected on August 12 and again in final yield for the 2021 growing season.

Point of Contact: Austin Pearson, Tipton County ANR Educator

Different Manure Sources Spring applied to Corn 2

Objective:

The producer treated two corn fields with two rates of chicken litter (CL) (1 T and 3 T). UAV flights and yield checks were conducted to check status of the crop. Field history and application details can be seen in the table and image below. It is important to note that this field is one mile east of Field 1.

Demonstration Details

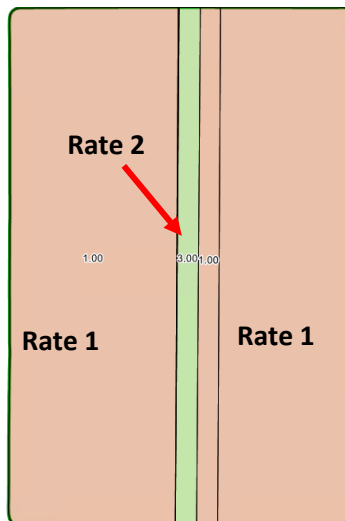
	CL Rate 1	CL Rate 2
Previous Crop	Soybeans	
Litter Application	Broadcast	
Tillage	Conventional	
Planting Date	April 26, 2021	
Planting Population	36K	
Row Spacing	30 in	
Planting Equipment	Deere 1770NT	
Relative Maturity	117	
Starter	20 gal	
Other Fertilizer	Anhydrous	
Harvest Date	Sept 21, 2021	Sept 27, 2021
Litter ton/ac	1.0	3.0
Average Yield (bu/ac)*	278.0	274.2
Flight Dates: June 14, July 6, 28		
Yield Estimate Date: August 12		

*Producer reported

Observations:

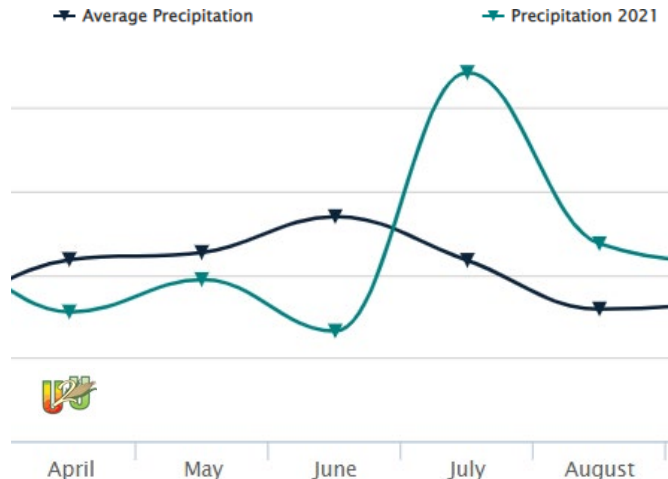
Treatment Blocks

Rate 1: 1 Ton/ac Layer litter
 Rate 2: 3 Ton/ac Layer litter

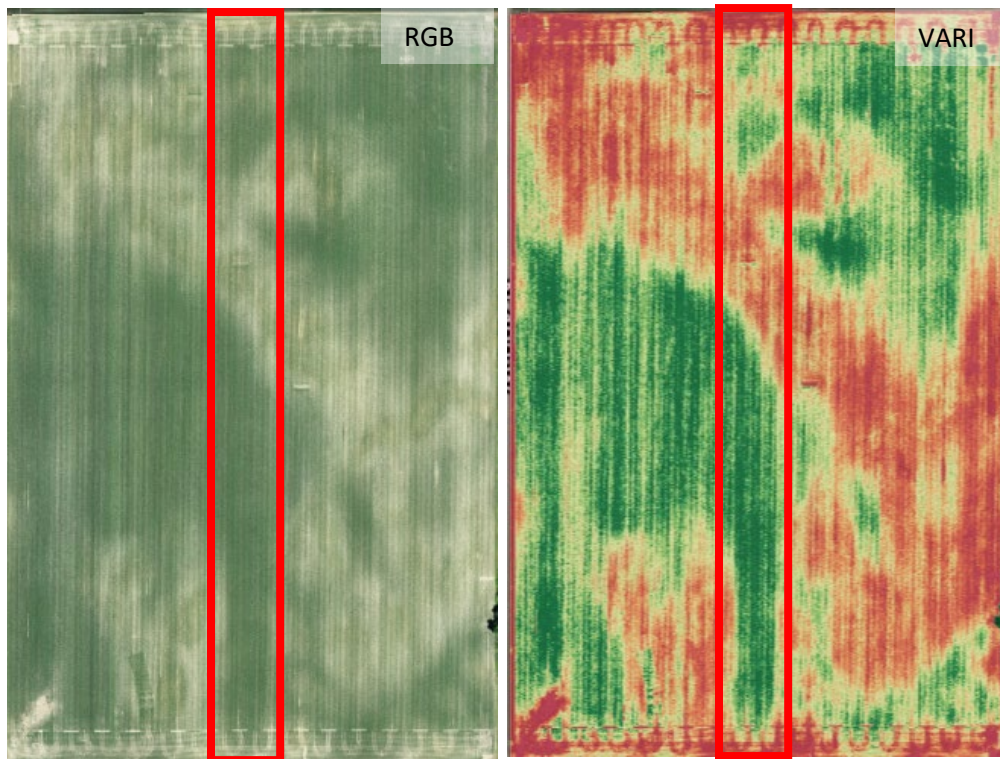


Weather

The weather trend for this field showed slightly dryer than average in the early season, much wetter in July, and dryer again in August.



UAV Imagery: 6-14



Three flights were conducted through June and July. During early season flights, soil interactions can be spotted in the aerial imagery. On the June 14 imagery, a green strip can be seen in both the plant health and VARI image (red rectangle). This is very close to the 3.0 T/acre chicken litter application rate. During both July 6 and 28 flights, treatment differences could not be seen. Additionally, bare spots and planter skips could be seen throughout the growing season. Another issue detected on the south side of the field was an planter auto-steer issue. A separate trial on the western side of the field was conducted and was visible in aerial imagery through the growing season.

Yield Estimates:

Yield estimates ranged (two different Kernel factors) as follows: Rate 1 – 264.3 to 299.6 and Rate 2 – 239.4 to 271.3. Yield estimates can be seen on the previous page. Farmer reported yields are as follows: Rate 1 – 278, Zone 2 – 274.2.9.

Average-Large Kernel (Factor 85)		Large Kernel (Factor 75)	
Rate 1 AVG	Rate 2 AVG	Rate 1 AVG	Rate 2 AVG
264.3	239.4	299.6	271.3
Field AVG	251.8	Field AVG	285.4

Summary:

Chicken litter rates (1 T and 3T) were applied three zones. Agronomic practices were consistent in both zones. Aerial imagery could pick up on treatment differences on June 14, but as the growing season progressed the treatment impacts were not visible by drone. Rate 2 yields were 3.8 bu/acre less compared to Rate 1.

Point of Contact: Austin Pearson, Tipton County ANR Educator

Varying Corn Populations (Demo 1)

Objective:

The producer wanted to evaluate corn plant populations using their average variable rate plus/minus approximately 5%. (variable rate technology average =38,500 seeds/ac, high rate = 40,000 seeds/ac, and low rate = 36,500 seed/ac). UAV flights were conducted to check the status of the crop. This was repeated on three other fields and an overall summary will be provided following the last field.

Demonstration Details

	Hybrid 1		Hybrid 2	
	Population 1	Avg Population Rx	Population 1	Avg Population Rx
Previous Crop	Soybeans			
Tillage	Conventional			
Planting Date	5/22/2021			
Row Spacing	30"			
Harvest Date	11/16			
Starter	10-34-0 blend			
Planting Equipment	Planter			
Planting Population	36,500 seeds/ac	38,500 seeds/ac	40,000 seeds/ac	38,500 seeds/ac
Relative Maturity	114	114	116	116
Average Yield (bu/ac)*	254.2	256.9	252.1	260.6

Flight Dates: June 17, July 15 and 28

*Producer reported

Observations:

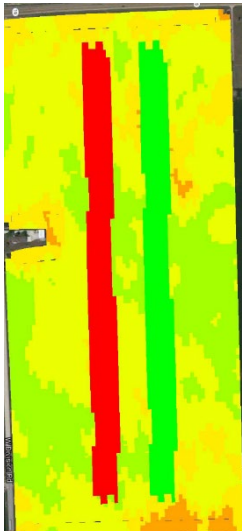
Treatment blocks:

The high seeding rate, 40,000 seeds/ac (green strip), and low rate, 36,500 seeds/ac (red strip), can be seen on the map. All other areas of the field received a prescription rate.

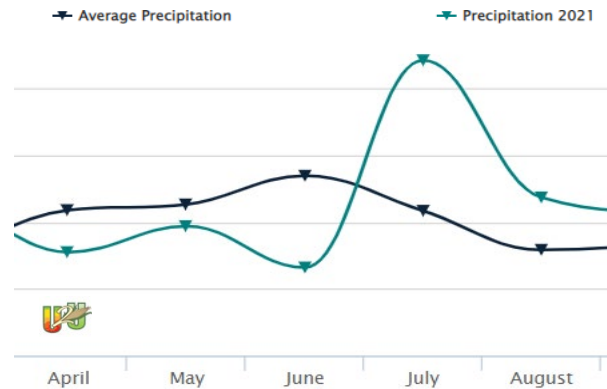
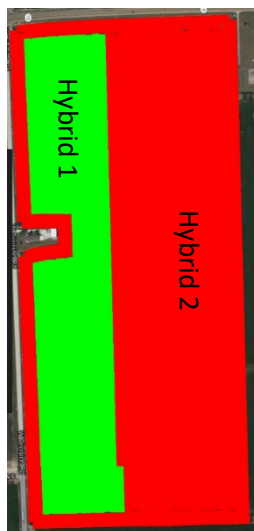
Weather: Precipitation

Throughout the growing season, precipitation varied tremendously (dry and wet periods). Overall, much of the growing season ended up being above normal.

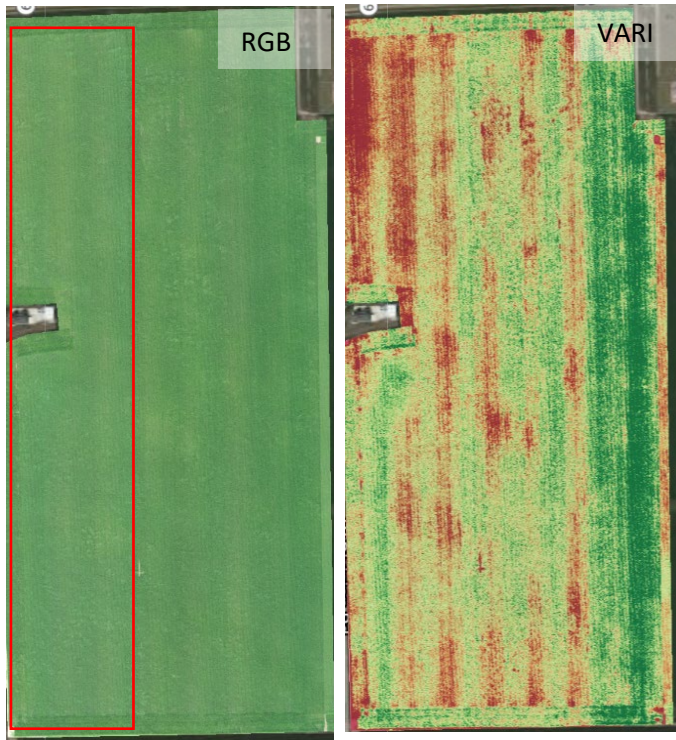
Seeding rate:



Hybrids

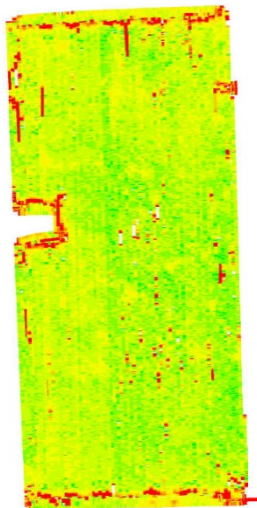


UAV Imagery:



Three flights were conducted through June and July. The early season flight (June 17), could not pick up on vegetation at the 400-foot flight altitude. Soil differences were noticed. During the July 15 flight (below), hybrid differences (hybrid 1, outlined in red) can be seen as a lighter green. A striping effect can be seen across the field (possibly system tile and/or sun shading effects with camera). Clouds were a factor in all flights. High and low population zones were not identified via aerial imagery.

Yields:



Yield (Dry) (bu/ac)	
■ Above 300.0	(1.70 ac)
■ 270.0 - 300.0	(19.49 ac)
■ 240.0 - 270.0	(42.76 ac)
■ 210.0 - 240.0	(15.92 ac)
■ 180.0 - 210.0	(3.64 ac)
■ 150.0 - 180.0	(1.83 ac)
■ 120.0 - 150.0	(1.26 ac)
■ Below 120.0	(3.14 ac)

Hybrid differences can be seen in yield, where Hybrid 1 visibly is a lighter color indicating an average lower yield compared to Hybrid 2. There is no clear visible difference based on population variation.

Summary:

The producer compared prescription seeding rates with lower seeding rates. In both comparisons for this demonstration, the prescription rate (varied across the field but averaging 38,500 seeds/acre) yielded more than either the lower or higher populations by 2.7 bu/acre and 8.5 bu/acre, respectively.

Point of Contact: Austin Pearson, Tipton County ANR Educator

Varying Corn Populations (Demo 2)

Objective:

The producer wanted to evaluate corn plant populations using their average variable rate plus/minus approximately 5%. (variable rate technology average = 38,500 seeds/ac, high rate = 40,000 seeds/ac, and low rate = 36,500 seed/ac). UAV flights were conducted to check the status of the crop. This was repeated on three other fields and an overall summary will be provided following the last field.

Demonstration Details

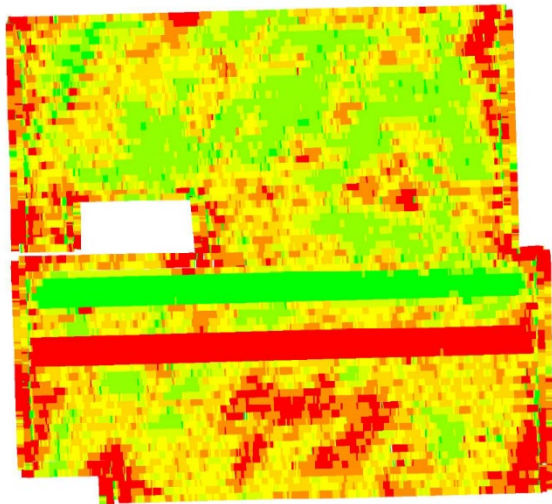
	Population 1	Population 2	Average Population Rx
Previous Crop	Soybeans		
Tillage	Conventional		
Planting Date	5/16/2021		
Row Spacing	30"		
Planting Equipment	Planter		
Relative Maturity	108		
Harvest Date	11/15/2021		
Starter	10-34-0 blend		
Planting Population	40,000 seeds/ac	36,500 seeds/ac	38,500 seeds/ac
Average Yield (bu/ac)*	257.5	252.9	257.6
Flight Dates: June 17, July 27 and 28			

*Producer Reported

Observations:

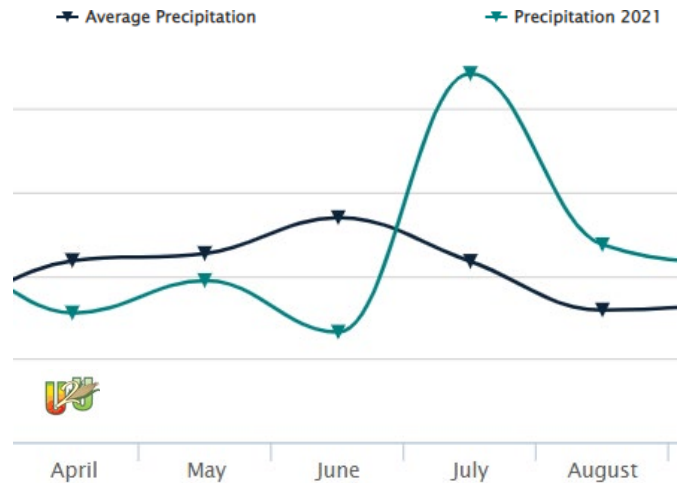
Treatment Rates:

The high seeding rate, 40,000 seeds/ac (green strip), and low rate, 36,500 seeds/ac (red strip), can be seen on the map. All other areas of the field received a prescription rate.

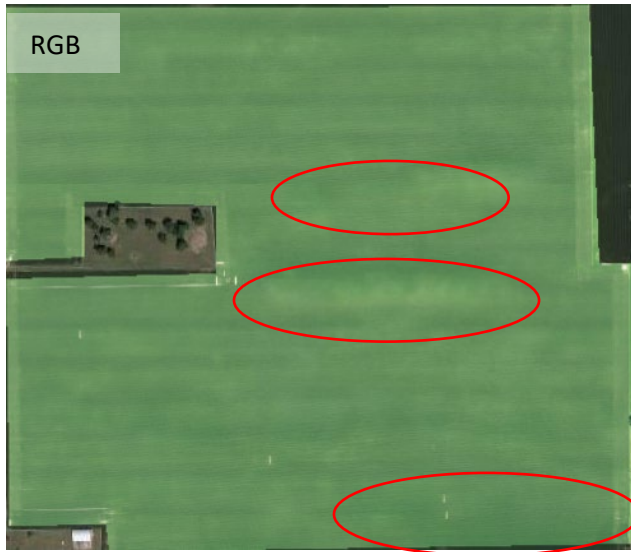


Weather: Precipitation

Throughout the growing season, precipitation varied tremendously (dry and wet periods). Overall, much of the growing season ended up being above normal.



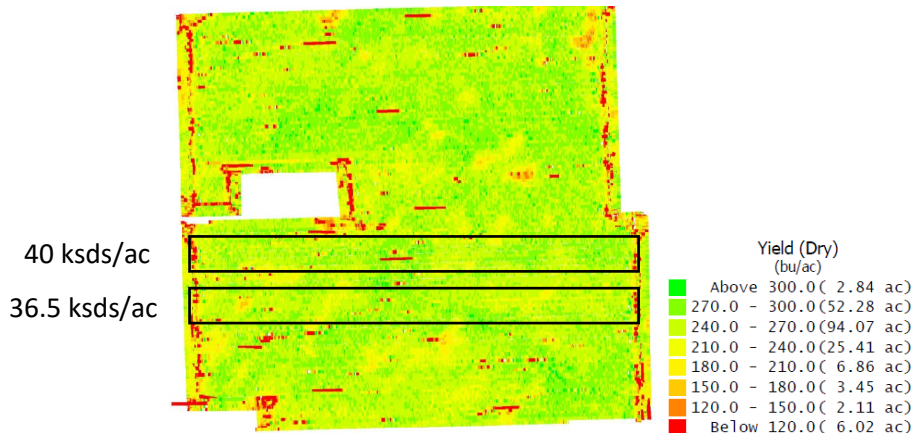
UAV Imagery: 07/27/21



All flights could not pick up on the different plant populations. It is also important to note that clear sky days were limited and clouds impacted image quality (red ovals). VARI (plant health) imagery was not included because of this. A RGB orthomosaic image from 07/27/2021 can be seen below.

Additional findings in the imagery were planter skips (bare spots) in the southern part of the field. A striping effect can also be seen across the field, which could be attributed to sun spots or tile.

Yields:



In this particular case, the prescription and 40 ksds/ac rate were very similar in yield, but were nearly 5 bu/acre higher than the 36.5 ksds/ac rate.

Summary:

In this particular case, the prescription and 40,000 seeds/ac rate were very similar in yield; however, the prescription was nearly 5 bu/acre higher than the 36,500 seeds/ac rate. Variation was not noted from the UAV flights

Point of Contact: Austin Pearson, Tipton County ANR Educator

Varying Corn Populations (Demo 3)

Objective:

The producer wanted to evaluate corn plant populations using their average variable rate plus/minus approximately 5%. (variable rate technology average = 38,500 seeds/ac, high rate = 40,000 seeds/ac, and low rate = 36,500 seed/ac). UAV flights were conducted to check the status of the crop. This was repeated on three other fields and an overall summary will be provided following the last field.

Demonstration Details

	Population 1	Population 2	Average Population Rx
Previous Crop		Soybeans	
Tillage		Conventional	
Planting Date		5/6/2021	
Row Spacing		30"	
Planting Equipment		Planter	
Relative Maturity		108	
Harvest Date		9/30/2021	
Starter		10-34-0 blend	
Planting Population	40,000 seeds/ac	36,500 seeds/ac	38,500 seeds/ac
Average Yield (bu/ac)*	290.9	290.4	292.7

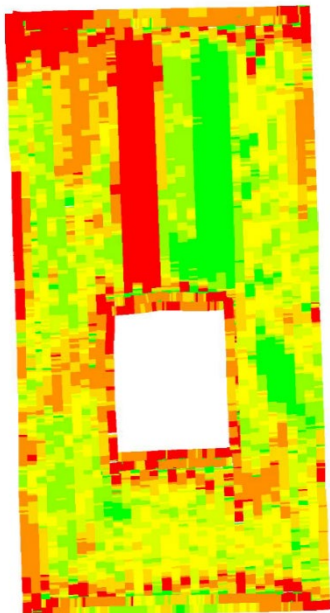
Flight Dates: June 16, July 6 and 28

*Producer Reported

Observations:

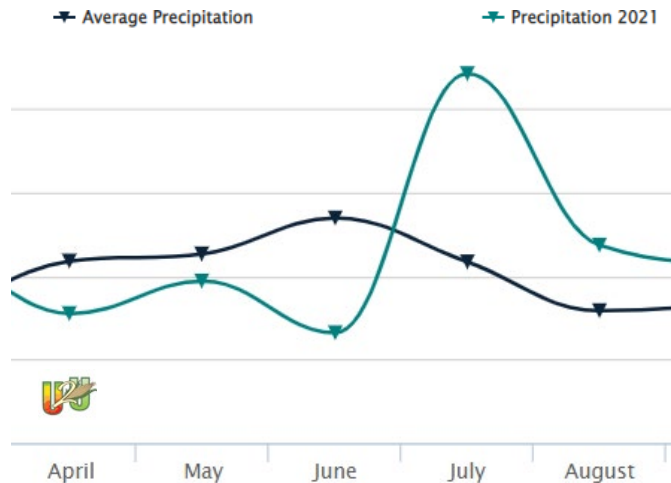
Treatment Rates:

The high seeding rate, 40,000 seeds/ac (green strip), and low rate, 36,500 seeds/ac (red strip), can be seen on the map. All other areas of the field received a prescription rate.

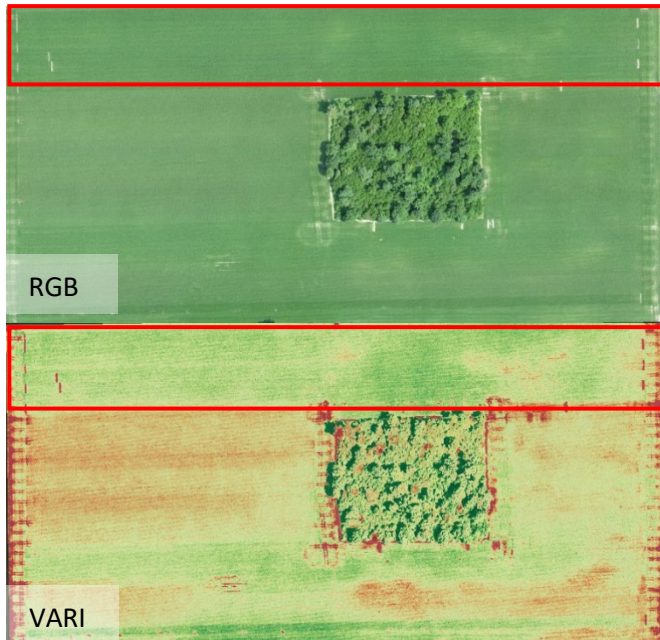


Weather: Precipitation

Throughout the growing season, precipitation varied tremendously (dry and wet periods). Overall, much of the growing season ended up being above normal.



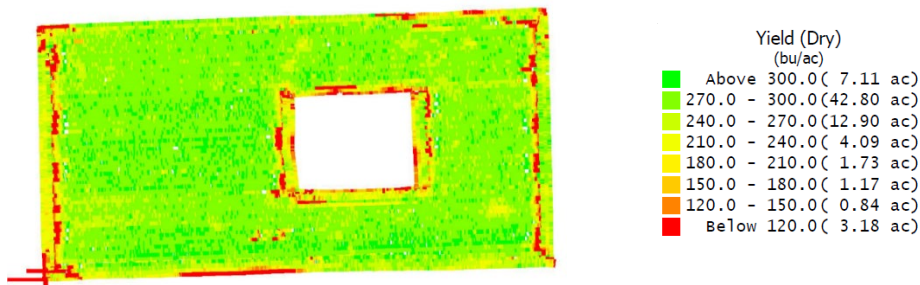
UAV Imagery: 07/06/21



Three flights were conducted through June and July. From the beginning of the season, physical differences from the air could be seen on the northern side of the map (possible planting date difference, not indicated by the producer). The vegetation appears to be physiologically more mature compared to the rest of the field (indicated by red box). Planter skips can be seen at the end rows and where the planter may have stopped and started again. Striping across the field can be seen, but seeding rate differences cannot be teased out.

Yields:

A yield map can be seen below. Yields appear to be very uniform across the field, especially on the west side of the field where the seeding rates were altered. Producer identified data indicate that the prescription rate was 292.7 bu/acre, which was nearly 2 bu/ac higher compared to the other two rates.



Summary:

Multiple flights could not pick up on treatment differences in the field, but possible a possible difference in planting date could be seen (north part of the field). Based on producer identified yield data, prescription rate yields (their standard practice) were nearly 2 bu/ac higher compared to the other two rates.

Seeding Rate Overall Summary:

For these three fields overall, there was no advantage to deviating from the prescription plan.

Point of Contact: Austin Pearson, Tipton County ANR Educator

Biological Application (Demo 1)

Objective:

This demonstration was conducted to evaluate a new biological product on the producer's farm. The biological was applied with starter fertilizer in strips, while a control was established using starter alone. UAV flights were conducted to check the status of the crop. This was repeated on three other fields and an overall summary will be provided following the last field.

Demonstration Details

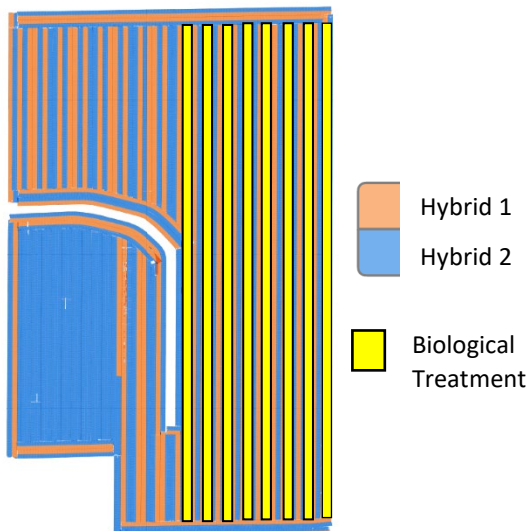
	Biological	No Biological
Previous Crop	Soybeans	
Tillage	Fall: Ripper Spring: Cultivator	
Planting Date	4/27/2021	
Planting Population	33,700	
Row Spacing	30"	
Planting Equipment	JD 1775NT; 16 row	
Relative Maturity	113 (2 hybrids)	
Harvest Date	11/03/2021	
Starter	28-0-0 in 2x2 10-34-0 +ATS in furrow Biological	28-0-0 in 2x2 10-34-0 +ATS in furrow
Average Yield (bu/ac)	260.17	259.71
Flight Dates: June 15, July 6 and 28		
Yield Estimate: August 12		

*Producer reported

Observations:

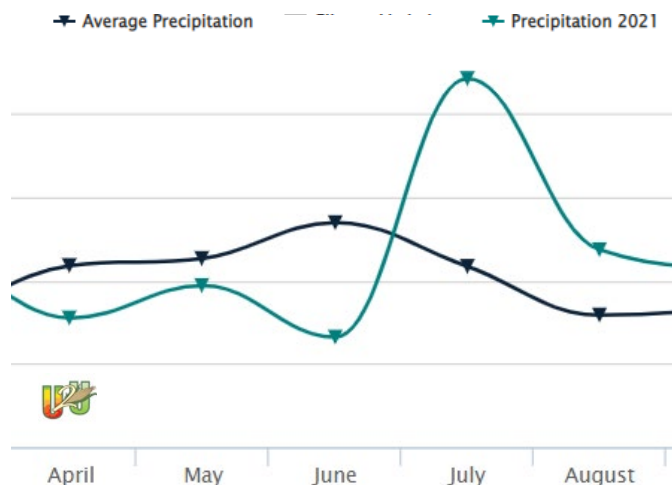
Treatments:

This demonstration was a split hybrid but both were the same relative maturity. Biological in-furrow was used in strips on the long passes of the field.

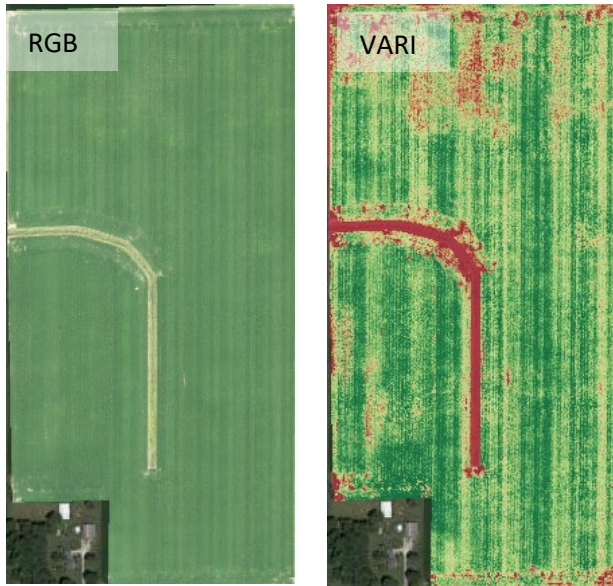


Weather: Precipitation

Throughout the growing season, precipitation varied tremendously (dry and wet periods). Overall, much of the growing season ended up being above normal.



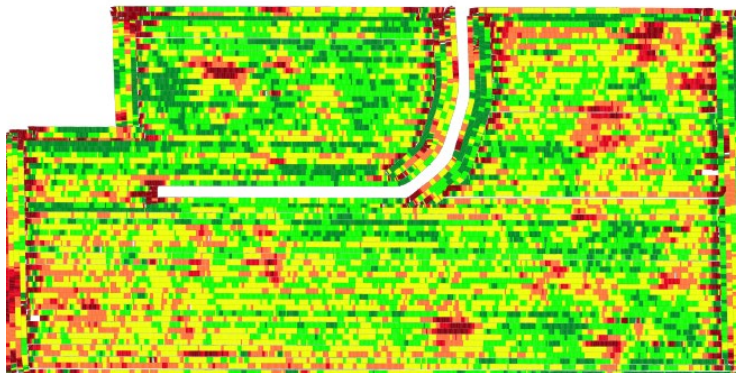
UAV Imagery: 07/06/2021



Aerial imagery primarily picked up on soil type differences as well as hybrid differences. It was difficult to identify treatment differences.

Yields:

A yield map is below. Comparing biological vs. no biological treatments, the producer noted no advantage in this field. The biological yielded 260.17 bu/ac and the control yielded 259.71 bu/ac. Additionally, given the different hybrids it was difficult to differentiate any advantages.



> 275 bu/ac
262 - 275 bu/ac
250 - 262 bu/ac
238 - 250 bu/ac
225 - 238 bu/ac
< 225 bu/ac

Summary:

Aerial imagery could not tease out hybrid differences vs biological treatments. Soil types differences on the northern half of the field could be seen.

Producer indicated yield results show no real advantage to using the biological in this demonstration.

Point of Contact: Austin Pearson, Tipton County ANR Educator

Biological Application (Demo 2)

Objective:

This demonstration was conducted to evaluate a new biological product on the producer's farm. The biological was applied with starter fertilizer in strips, while a control was established using starter alone. UAV flights were conducted to check the status of the crop. This was repeated on three other fields and an overall summary will be provided following the last field.

Demonstration Details

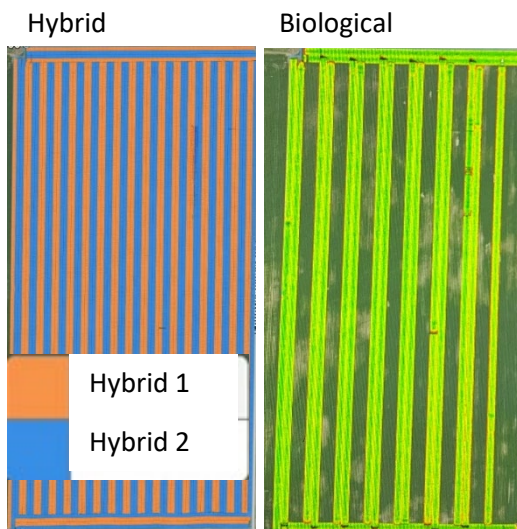
	Biological	No Biological
Previous Crop	Soybeans	
Tillage	Fall: Ripper Spring: Cultivator	
Planting Date	5/05/2021	
Planting Population	36,200	
Row Spacing	30"	
Planting Equipment	JD 1775NT; 16 row	
Relative Maturity	107/108	
Harvest Date	11/05/2021	
Starter	28-0-0 in 2x2 10-34-0 +ATS in furrow Biological	28-0-0 in 2x2 10-34-0 +ATS in furrow
Average Yield (bu/ac)*	256.38	256.36
Flight Dates: June 14, July 6, 15 and 28		
Yield Estimate: August 12		

*Producer reported

Observations:

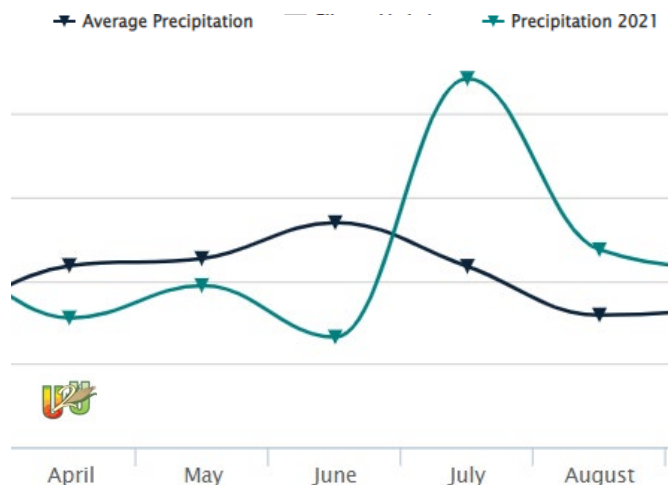
Treatments:

This demonstration was a split-planter hybrid (8 rows each) with two maturities. Biological in-furrow was used in strips either on or off for the planter (16 rows).



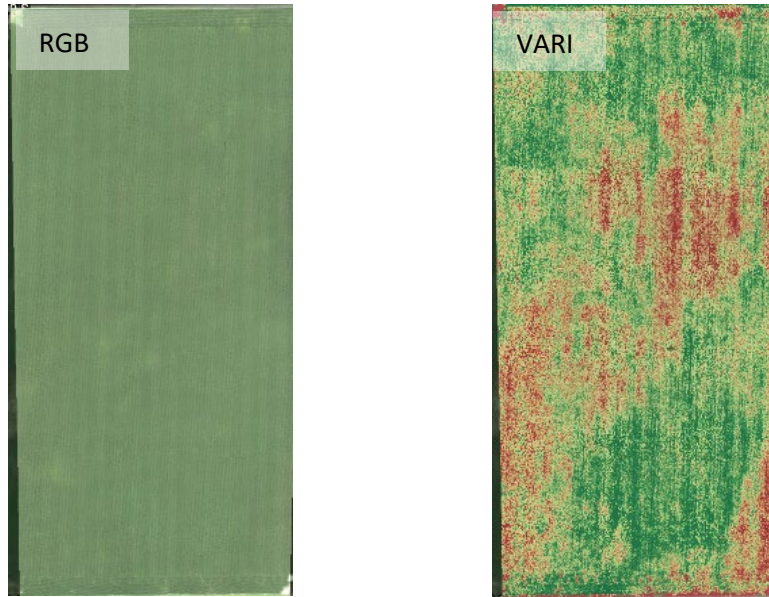
Weather: Precipitation

Throughout the growing season, precipitation varied tremendously (dry and wet periods). Overall, much of the growing season ended up being above normal.



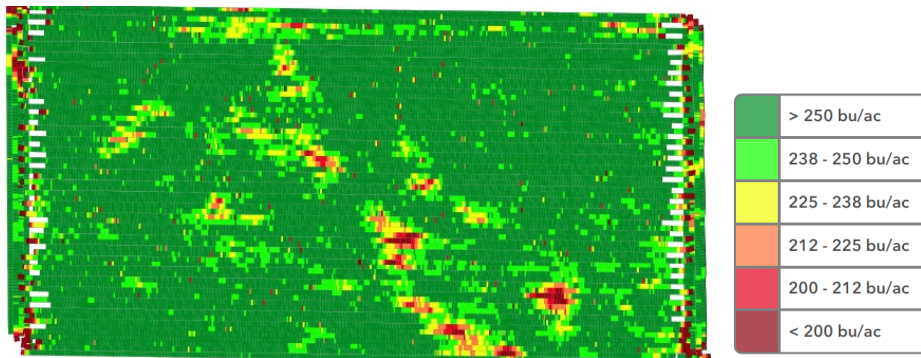
UAV Imagery: 07/28/21

Imagery differences are due to hybrid and soil type. Fields appear to be fairly uniform with limited bare spots.



Yields:

Plant health imagery variation is similar to the yield map, which is a positive sign for the technology. Producer reported treatment impact on yields is minimal as the biological treated corn yielded 256.38 bu/ac and the no biological corn yielded 256.36 bu/ac.



Summary:

Hybrid and soil type differences could be seen via aerial imagery; however, no treatment variation was noted.

Field averages for each of the treatments were very similar, which actually played out in the producer reported yields. Again, there were minimal differences in the biological vs no biological treatments.

Point of Contact: Austin Pearson, Tipton County ANR Educator

Biological Application (Demo 3)

Objective:

This demonstration was conducted to evaluate a new biological product on the producer’s farm. The biological was applied with starter fertilizer in strips, while a control was established using starter alone. UAV flights were conducted to check the status of the crop. This was repeated on three other fields and an overall summary will be provided following the last field.

Demonstration Details

	Biological	No Biological
Previous Crop	Soybeans	
Tillage	Fall: VT Spring: None	
Planting Population	35,800	
Row Spacing	30"	
Planting Equipment	JD 1775NT; 16 row	
Harvest Date	11/05/2021	
Starter	28-0-0 in 2x2 10-34-0 +ATS in furrow Biological	28-0-0 in 2x2 10-34-0 +ATS in furrow
Planting Date	5/21/21	5/22/21
Relative Maturity	109/110	109
Average Yield (bu/ac)	234.0	245.0

Flight Dates: June 15, July 15, 28

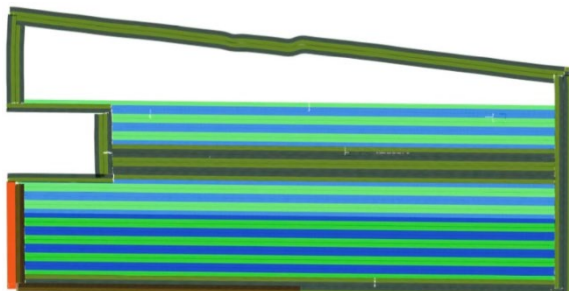
*Producer reported

Observations:

Treatments:

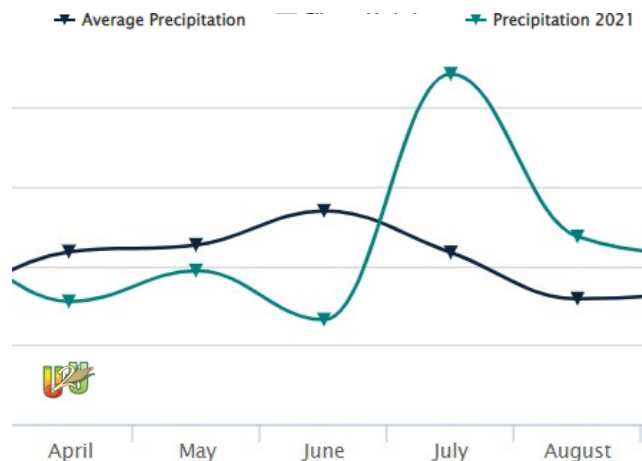
This demonstration was a split-planter hybrid (8 rows each) with two maturities shown by the light green and blue lines. These blocks also received the Biological treatment.

The area in the center that is dark green and the white area are the 109 day hybrid and no biological.



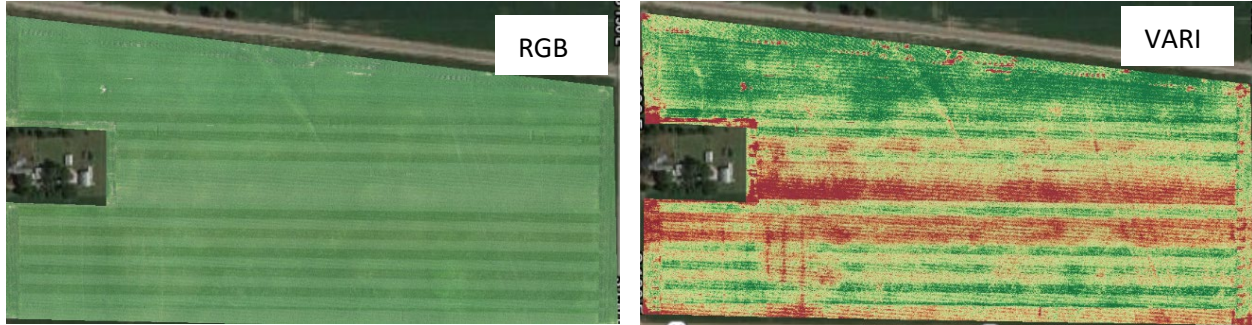
Weather: Precipitation

Throughout the growing season, precipitation varied tremendously (dry and wet periods). Overall, much of the growing season ended up being above normal.



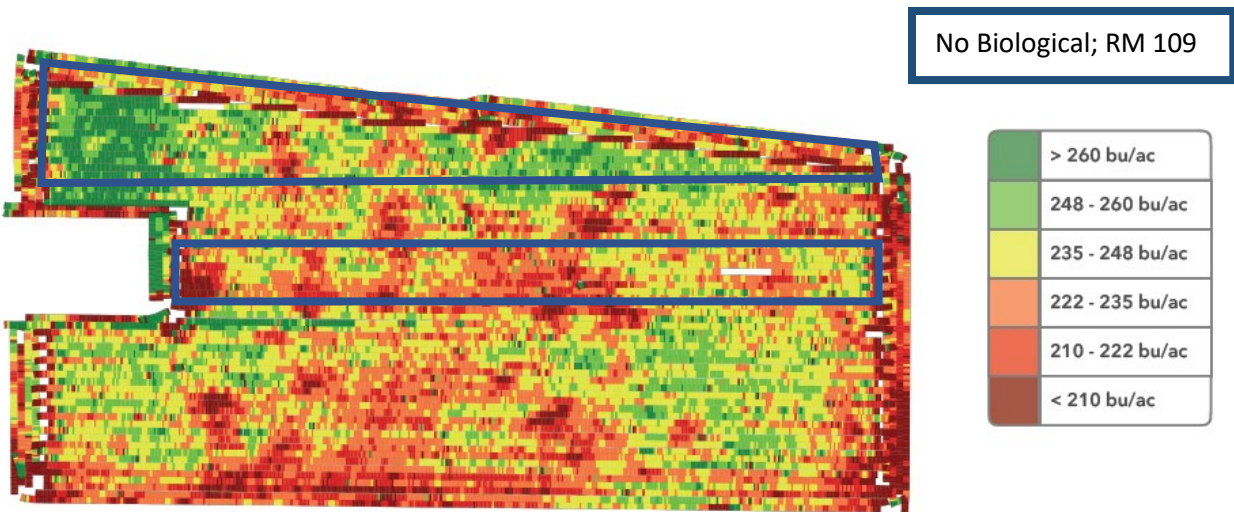
UAV Imagery: July 15, 2021

Notable differences in aerial imagery are the different hybrids, newly placed tile (within last few years). Differences in maturity can also be seen as there was variation in planting dates. Similar to previous fields, biological treatment differences could not be seen. Aerial imagery did match up well with the yield.



Yields:

Yields were 245 bu/acre without the biological treatment and 234 bu/acre with the biological treatment.



Summary:

Aerial imagery could pick out newly placed tile and hybrid differences. The biological treated corn yielded 11 bu/ac less, based on producer reported yields. Hybrid variability did not appear to affect the treatment but this is a possibility.

Overall Biological Summary:

For the three field demonstrations to evaluate in-furrow biological, the treatment either did not impact yield or it was lower. With rising input costs and uncertain return, the producer will not proceed with the biological treatment in 2022.

Point of Contact: Austin Pearson, Tipton County ANR Educator

Flame Weeding Food-Grade Blue Corn

Objective:

This demonstration showcases flame-weeding in practice which, similar to using electricity to zap weeds, is often a viable option in organic and/or food-grade production systems.

Demonstration Details

Field Information	
Tillage	Speed Disc
Planting Date	Late May
Row Spacing	30 inches
Planting Equipment	Planter
Crop	Organic Blue Corn
Weeding Equipment	16 row cultivator modified to flame weed
Fuel Type	Propane
Flamer Capacity	500 gallons
UAV Flight: 6-29, 7-2, 7-27, 9-16,	
Plant evaluations: 6-30, 9-16	

Notes:

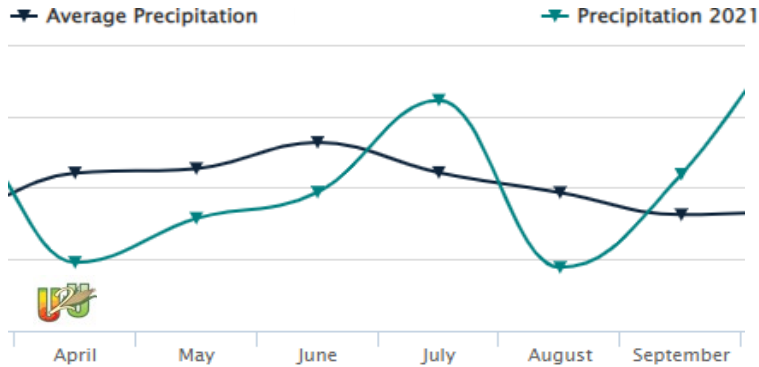
Each burner can produce between 500,000 and 1,000,000 BTUs.

Multiple passes were made over the growing season to keep weeds controlled.

Observations:

Weather:

The closest weather station showed slightly drier growing conditions May and June, wetter conditions in July, and dryer in August and September than average.

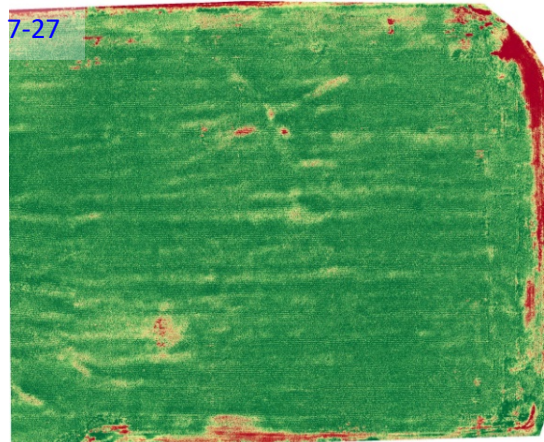


UAV Imagery:

7-2: Flame weeding operation was completed for about half of the visible area of this image 3 days prior.



7-27: Corn is relatively uniform in greenness at this point. Striping in some parts of the field may be attributed to repeated flame weeding operations where lighter colored areas may have some leaf damage from those operations. It is also possible that this shows some nutrient deficiency.



Striping is more apparent in the NDVI image.

Raccoon Damage



Image showing the crop just above the canopy.

9-16: Corn has black-layered. The map shows some wheel tracks from various field operations through the season and the area at the top of the image shows raccoon damage. Overall corn appears healthy and weed pressure is low.

Summary:

The overall story here is that flame weeding may look scary at first, because it kills the lower leaves of corn plants. When this happens the plants turn black, then white, before growth allows the field to return to green. As shown in the demonstration, corn plants come out of it just fine in the end and weeds remain controlled. This is effective in organic or chemical-free systems and also allows for the control of chemical resistant weeds.

Point of Contact: Ashley Adair; Purdue Extension Organic Agriculture Specialist

Poultry Litter on Soybean

Objective:

For logistical reasons this producer treated approximately 4 acres with chicken litter on a different soybean field in the previous season, resulting in over 100 bushel soybeans. This demonstration was conducted to attempt replicating those results.

Demonstration Details

	Treated with Chicken Litter	Untreated
Manure Application Date	4-22	-
Manure Rate	1 ton/acre	-
Planting Date	5-22-2021	
Planting Population	140,000 seeds/acre	
Row Spacing	15 inches	
Planting Equipment	Planter	
Maturity Group	2.4	
Harvest Date	9-20	
Average Yield (bu/ac)*	60	

Notes:

Chicken litter was sourced from a commercial layer operation.

Field was treated with herbicide prior to R1 and a fungicide and foliar nutrient package around R3.

UAV Flight dates: 6-1, 6-11, 6-19, 6-28, 7-12, 7-26, 8-10, 8-23, 9-8

Tissue Samples: 6-15, 6-28, 7-12, 7-26, 8-10, 8-23

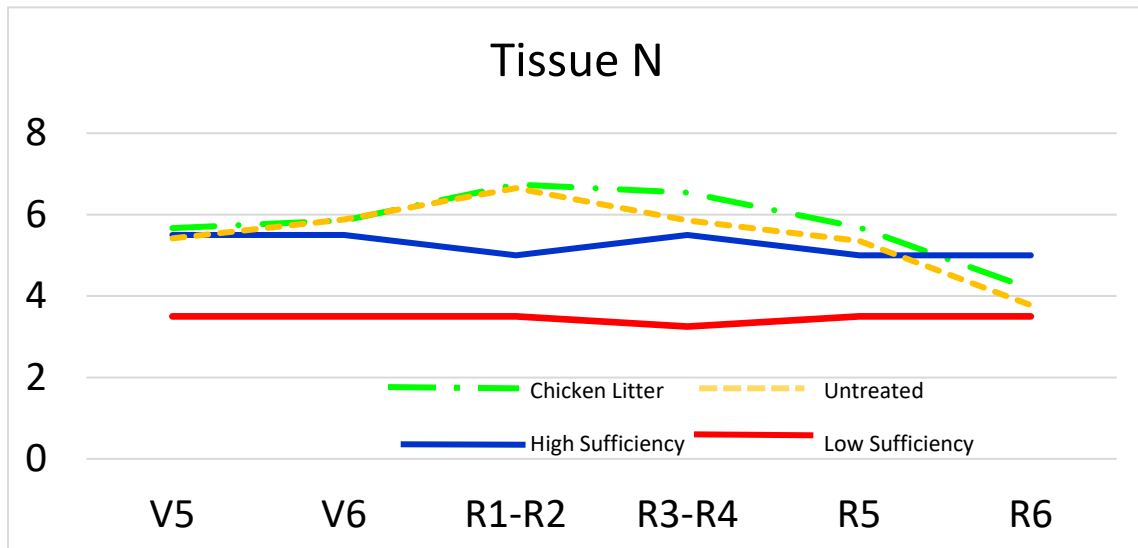
Nodule Evaluation: 6-19 & 8-2

*Producer reported

Observations:

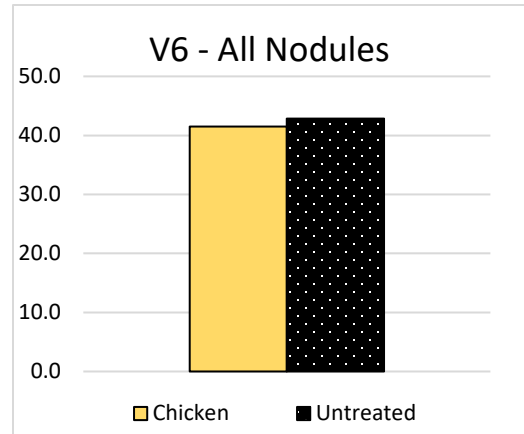
Leaf Tissue:

Tissue nitrogen (N) was numerically higher in the reproductive stages but not statistically different. In the vegetative stages the treated and untreated were not different. These trends are likely due to delayed N release from the chicken litter.



Nitrogen Fixing Nodules:

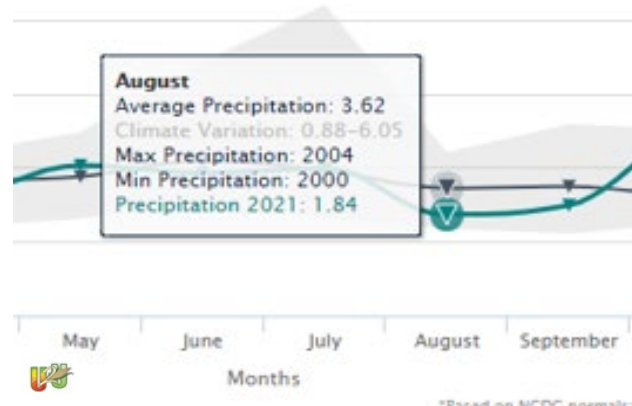
There was no difference in nodulation when comparing the treated block to the untreated block in either soil type at V6. This indicates that any nitrogen received from the chicken litter did not hinder nodulation and likely nitrogen fixation. This is potentially due to delayed N mineralization from the manure.



Weather Data:

Being a maturity group 2.4 these soybeans matured earlier in the season (Late August/Early September) than a fuller season variety (Early-Mid September). With this maturity the critical seed fill window was mid-August (as opposed to late August/early September for a full season). August 2021 was drier than normal having 1.78 inches less rain than an average year. More specifically in the seed fill window for these soybeans rainfall totaled .18 inches and there was no rainfall for prior to the first event through late July.

Date	Precip (2021)	Date	Precip (2021)
1	0	17	0
2	0	18	0.05
3	0	19	0
4	0	20	0
5	0	21	0
6	0	22	0
7	0	23	0
8	0	24	0
9	0	25	0.58
10	0	26	0.01
11	0.11	27	0
12	0.02	28	0
13	0	29	0.24
14	0	30	0.02
15	0	31	0
16	0		



 Seed Fill Window

Summary:

Final yields were on average reported to be 60 bushel/acre for both the treated and untreated areas.

No difference in yield was not surprising due to late season dry weather in August during seed fill for the early maturing varieties.

Point of Contact: John Scott; Digital Agriculture Coordinator / Kelsey Holt; Carroll County ANR Educator

Soybean Biological Starter & Inoculant

Objective:

This demonstration was conducted to observe differences in starter and inoculant application with soybean seeds. It consisted of a biological and inoculant treatment, an inoculant only treatment, and an untreated block as a baseline for treatment comparison over current practices.

Demonstration Details

	Starter & Inoculant	Inoculant only	Untreated
Seed Treatment	Escalate® SDS, Extend Plus		
Fertility	100 lbs Ammonium Sulfate (AMS) Broadcast pre-plant.		
Previous Crop	Corn		
Cover Crop	Cereal Rye		
Tillage	No-Till		
Planting Date	4-27-2021		
Planting Population	145,000 seeds/acre		
Row Spacing	30 inches		
Planting Equipment	Planter		
Maturity Group	3.5		
Harvest Date	9-22		
Starter**	Yes	-	-
Inoculant†	Yes	Yes	-
Average Yield (bu/ac)*	70	62	60
UAV Flight dates: 6-23, 6-29, 7-7, 7-23, 8-3, 8-19, 8-30			
Nodule Evaluation: 6-9 & 7-7			

Notes:

Demonstration consisted of three blocks approximately 20 to 25 acres each. Block A (See map) was treated with Surge in-furrow as a starter along with inoculum. Block B (see map) was treated with inoculum only. Block C (see map) was untreated.

Cereal Rye was terminated with glyphosate prior to planting.

A herbicide post was completed around R1. No other applications were made.

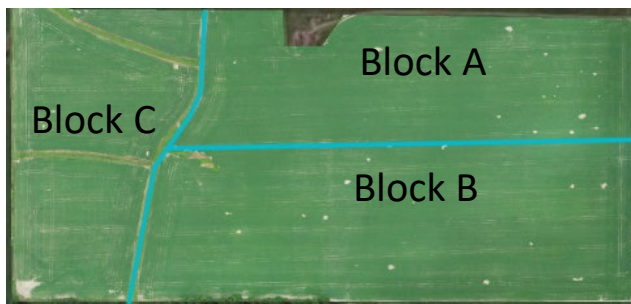
**Starter: Surge – Humic Acid, Fluvic Acid, sugars, plant growth hormones, microbes

†Inoculant: First Choice

*Producer reported

Observations:

Treatment blocks:

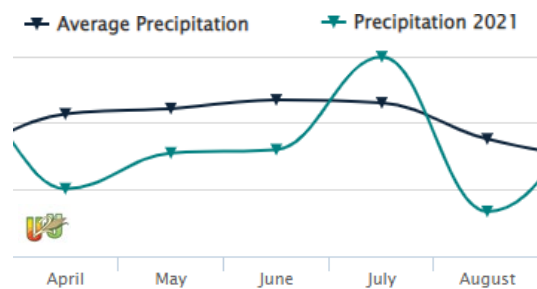


Block A: Full treatment – Surge and Inoculant

Block B: Inoculant only

Block C: Untreated

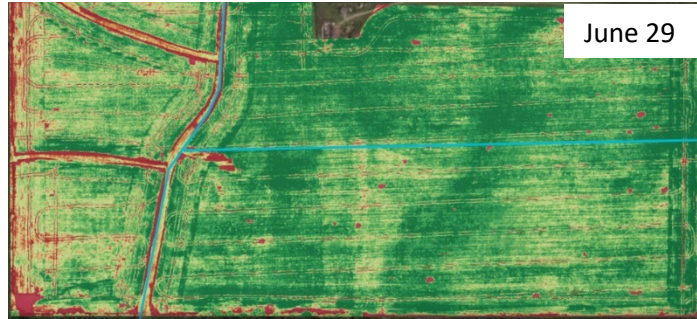
Weather: Precipitation



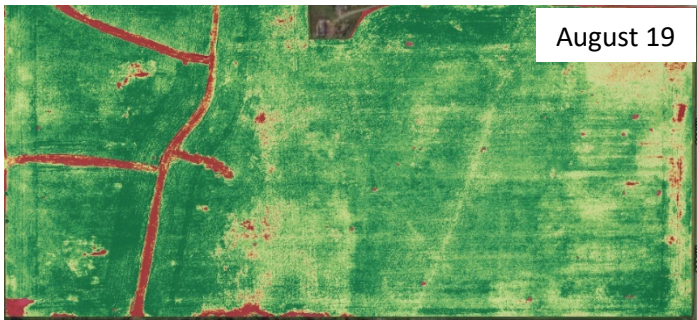
Rainfall was consistently low in the early growing season before being above average in July and then much drier than average in August during the seed fill period.

UAV Imagery:

The plant health (VARI) map from June 29 shows an indication that the treated areas are greener than the untreated area. Further the full treatment (starter & inoculant) appears greener than inoculant alone.

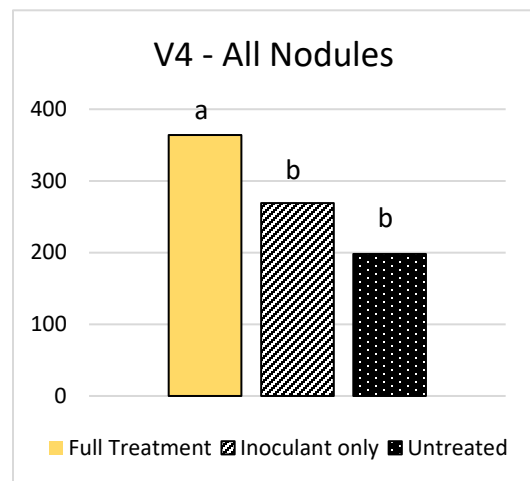


The plant health (VARI) map from August 19 shows that the areas originally observed to be different are now similar. The area along the waterway is greener, likely due to greater moisture retention during the drought but there is not observable difference between treatment blocks.



Nodulation:

Plants were collected and nodules were counted and weighed at V4. There was no difference in weight for the full treatment compared to inoculant only. There was only minor difference between and treatments and the untreated nodule weight. Nodule counts resulted higher overall counts (both tap and lateral roots) for the full treatment compared to the other two treatments. The inoculant only treatment and untreated were not statistically different with a 90% confidence.



Summary:

Harvest occurred in late September. According to the producer the full treatment (starter and inoculation) out yielded the untreated block by 10 bushels. The starter compared to the inoculation was about 8 bushels better. Inoculated compared to untreated had a 2 bushel yield advantage. Early season differences were observed in the blocks but this was not observed in the latter part of the growing season. This indicates that the full treatment may have helped the soybeans in the earlier part of the growing season giving them a competitive advantage.

Point of Contact: John Scott; Digital Agriculture Coordinator

Non-inoculated Soybean After 10 Year Conservation Reserve Program (CRP)

Objective:

This demonstration observes how soybean yielded without inoculant after 10 years in CRP.

Demonstration Details

Soybean Information	
Previous Crop	CRP
Tillage	No-Till
Planting Date	5-23-2021
Planting Population	210,000 seeds/acre
Row Spacing	7.5 inches
Planting Equipment	Drill
Maturity Group	2.8
Harvest Date	9-26
Inoculant	No
Average Yield (bu/ac)*	62.1
UAV Flight: 7-26	
Plant evaluations: 6-11 & 7-26	

*Producer reported

Notes:

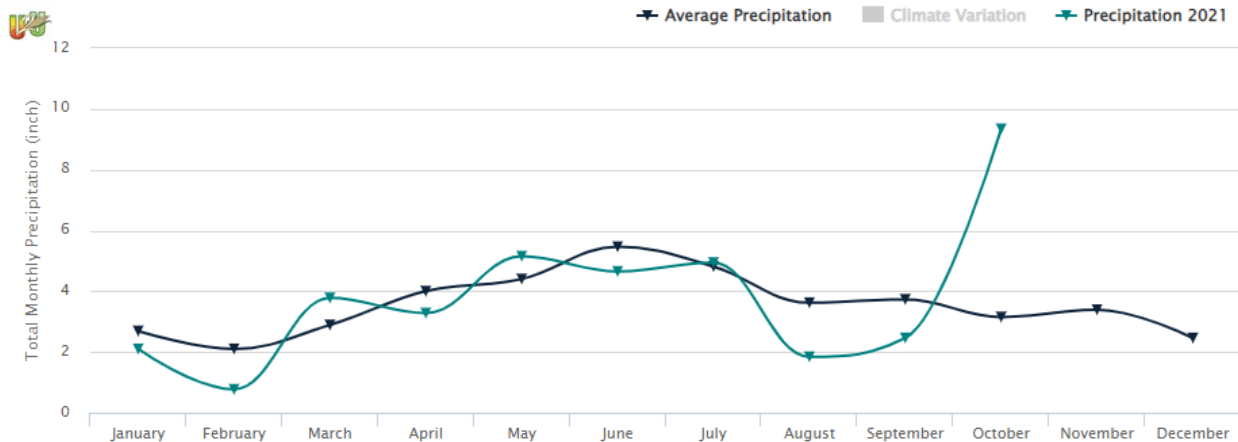
Field was treated with herbicide post.

The field had been in CRP for 10 years, recommendations are to inoculate soybean seeds when no soybeans are grown for a long time period. In this instance the producer was planting soybeans in other fields and simply forgot to add the inoculum when switching fields. The producer wanted to know if a rescue treatment would be beneficial and after scouting and seeing nodulation was recommended against a rescue treatment.

Observations

Weather: Precipitation

The beginning through mid-growing season tended to be about average with May slightly wetter, June slightly drier, and July on trend. Late July through September was much drier than normal and occurred during the seed fill window for soybeans.



Nodulation

During the initial visit (6-11) plants were mostly V2 with some V1. The V1 plants were generally not nodulated while the V2 plants had nodules.

During the second visit all plants had nodules on both the tap root and lateral roots. It is unknown if any of the non-nodulated plants survived and nodulated later or if they were out-competed by the healthier plants.



UAV Flight

A UAV flight was conducted on 7-26 to see if there was any difference across the field in terms of canopy cover. None was noted.

Image A shows the demonstration field in the background and the reference field is across the road in the foreground.

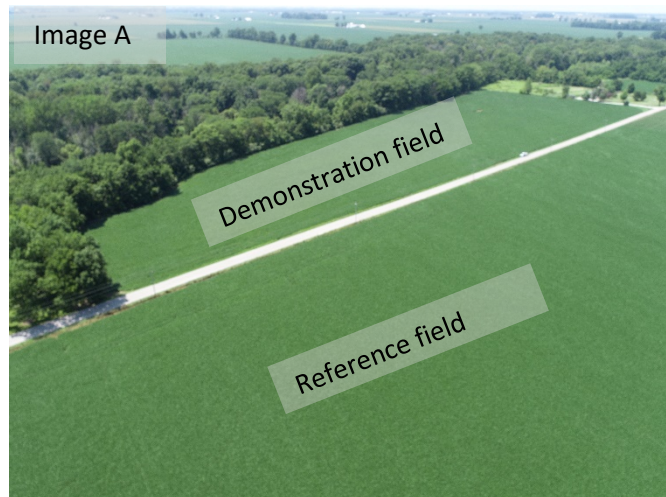


Image B shows a closer image of the demonstration field's center.

Summary:

The demonstration field yielded 62.1 bushels/acre. According to the farmer this was almost 5 bushels higher than the same variety planted in the reference field (a conventional corn/soybean rotation). Though this was a positive result it is recommended to inoculate the seed next time this field goes to soybeans. It is also notable that the higher yielding field had just been brought back into production after a decade as CRP.

Point of Contact: John Scott; Digital Agriculture Coordinator / Kelsey Holt; Carroll County ANR Educator

High Management, High Yield Soybean Attempt

Objective:

This demonstration was a high yield attempt in soybeans using a starter and micronutrient custom prescription.

Demonstration Details

	2x2 with Micronutrients	2x2 only	Untreated
Plot Type	Blocks		
Previous Crop	Corn		
Tillage	No-Till		
Planting Date	4-27-2021		
Planting Population	110,000 seeds/acre		
Row Spacing	30 inches		
Planting Equipment	Planter		
Maturity Group	2.5		
Harvest Date	10-30		
Average Yield (bu/ac)*	45		
UAV Flight dates: 6-24, 7-23, 9-10			
Tissue Samples: 6-15, 6-28, 7-12, 7-26, 8-10, 8-23			

*Producer reported

Notes:

This demonstration was a field split into 3 blocks. Block A (See Map) was treated with 2x2 and Micronutrients, Block B was treated with 2x2 only, and Block C was not treated, serving as the control.

Micro nutrients were added to the post applied herbicide based on low tissue test results.

Observations

In early May this field was soil sampled and due to a pounding rain emergence was noted as poor. The overall stand in this field remained low all growing season.

Treatment blocks:

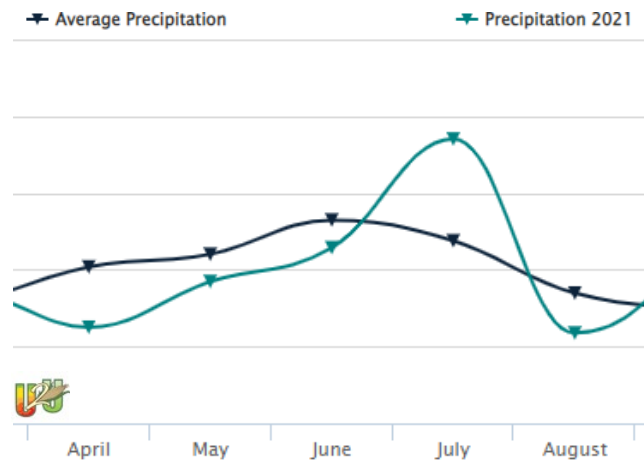
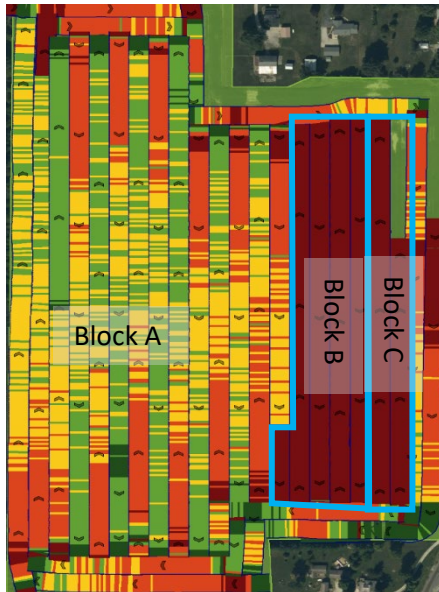
Block A: 2x2 and Micronutrients

Block B: 2x2 only

Block C: Untreated Control

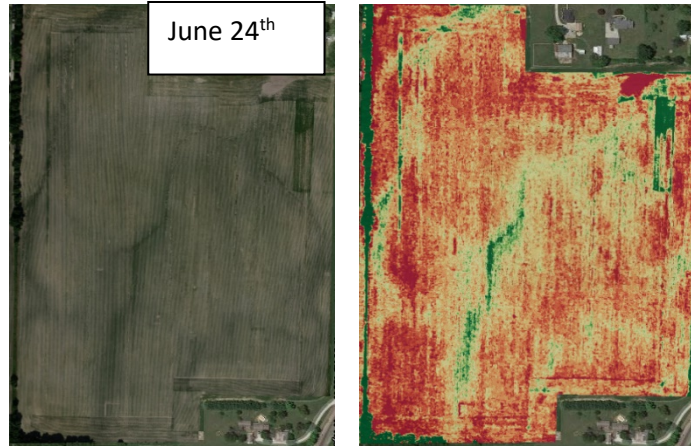
Weather: Precipitation

The weather trend for this field showed slightly dryer than average in the early season, much wetter in July, and dryer again in August.



UAV Flights

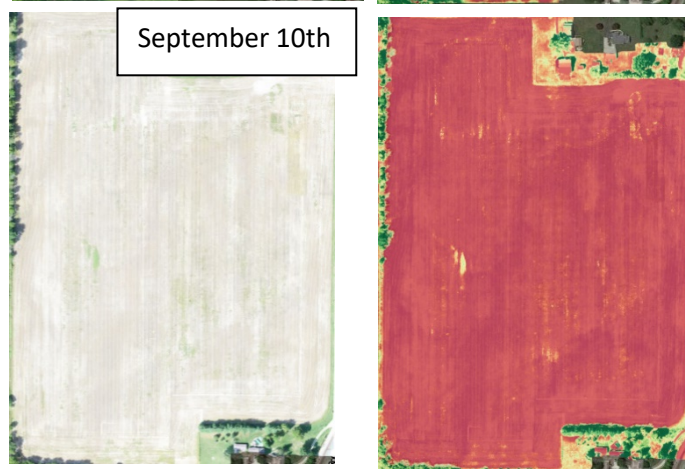
In late June the soybeans were nearing early reproductive stages but hadn't canopied. No visual difference in treatment was noted aerially or on the ground.



By Mid July through August extremely dry conditions caused poor pod development. The imagery can show tough areas in the field.



By September 10th, these beans were done, and no difference in treatment could be noted from the air.



Summary:

The growing season was tough on this field with very wet conditions early, causing poor stand establishment in some areas and rill erosion in others. This was followed by extremely dry conditions causing poor pod development. Overall there was no yield impact due to either treatment when compared to the control.

Point of Contact:

Adam Shanks; Clinton County ANR Educator

Soil Recovery After Drainage Tile Installation in Soybean

Objective:

This demonstration was conducted to observe field response in the season immediately after drain tile installation. A drainage system was installed in the fall/winter and in the spring the field was planted to soybeans.

Demonstration Details

	Drain Tile Installed	No Drain Tile Installed
Tillage	Spring Disc	None
Previous Crop	Corn	
Planting	Late April/Early May	
Planting Equipment	Planter	
Maturity Group	2.8	
Harvest	October	
UAV Flight dates: 3-13, 4-13, 5-5, 6-16, 8-11, 9-16, 11-8		

Notes:

This demonstration was a field split into 2 blocks where the upper left quarter was not tiled but the rest of the field was tiled in the winter. Soil trenched from the tile ditches was pushed back in but not worked. The system connects to a county main.

Observations

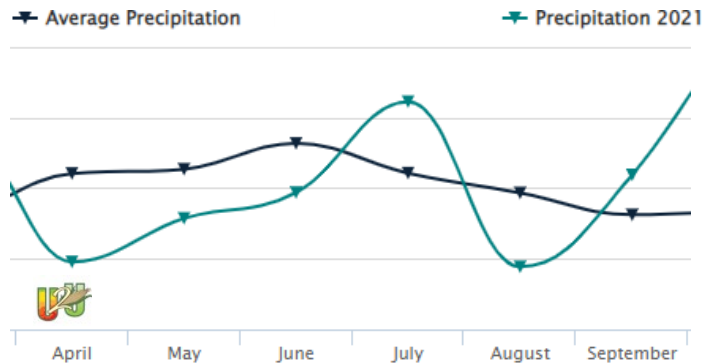
Treatment Blocks:

This shows the division between the area where the tile was installed relative to the area the tile wasn't installed.



Weather:

The closest weather station showed slightly drier growing conditions May and June, wetter conditions in July, and dryer in August and September than average.

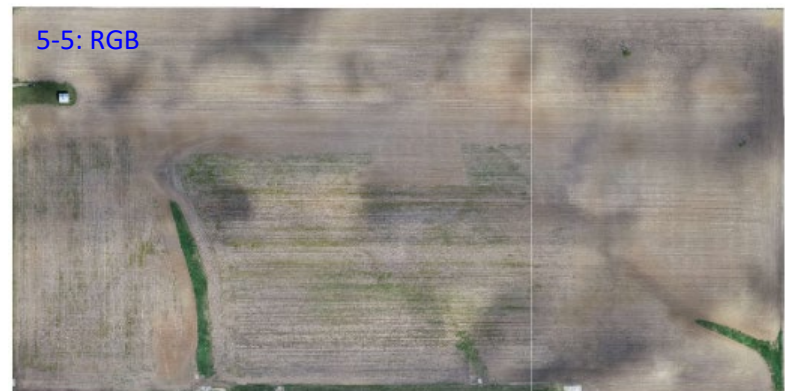


UAV Flights

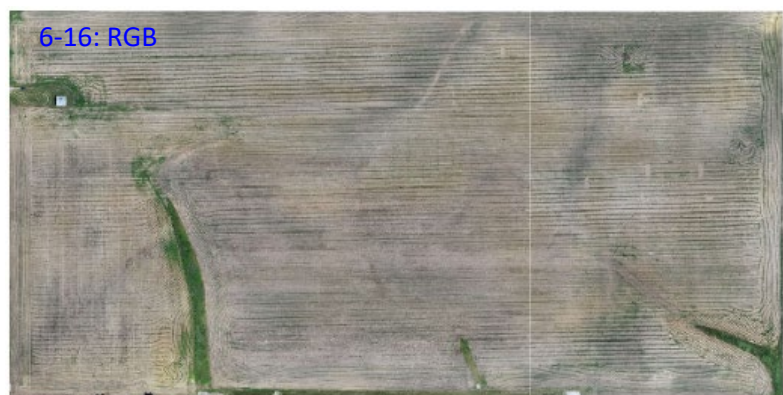
4-13: Discing smooths out the pile left over the tile trench but the trenches are still apparent.



5-5: Planting smooths the trenches even more. Field was planted in stages because the untilted area was wet.

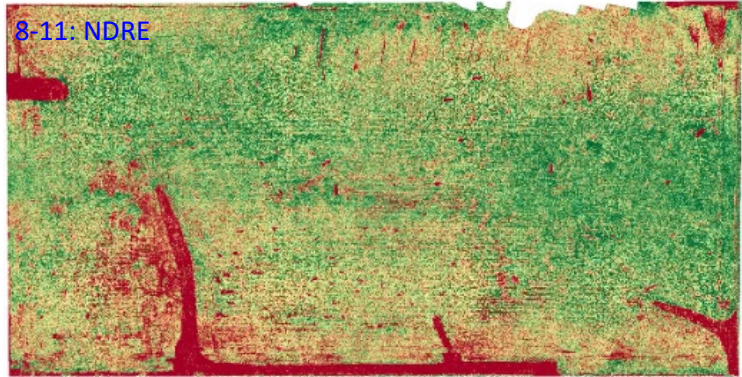


6-16: Approximately 6 weeks after planting. It is more difficult now to notice a difference between the tilled and untilted areas but not impossible.



8-11: Many of the tiled areas of the field show less stress than the untilled area; however, the previous six weeks before the flight this field had only received 2.5 inches of rain.

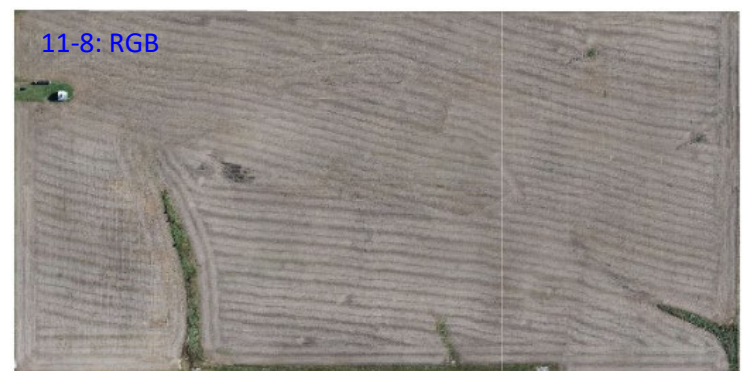
The NDRE (plant health map, top) shows the tiled area as greener indicating that the plants are healthier in general.



9-16: Dry areas of the field began dropping leaves first. Tile Lines are becoming visible again in areas that have dropped most leaves.



11-8: Harvest completed. Tile lines are difficult to make out at this stage, but if you look closely at the top right, it is possible to see 'stripping' left where the combine sank slightly over the tiles. This indicates that the soil was still settling after almost a year.



Summary:

Tile drainage appeared to promote healthier plants in the growing season and allowed plants to mature more uniformly later. This demonstration also indicates that after new tile installation soil settling is a lengthy process and fieldwork should not take place in questionable conditions to avoid getting stuck.

Point of Contact: Ashley Adair; Extension Organic Agriculture Specialist

2021 Tissue Testing Pilot

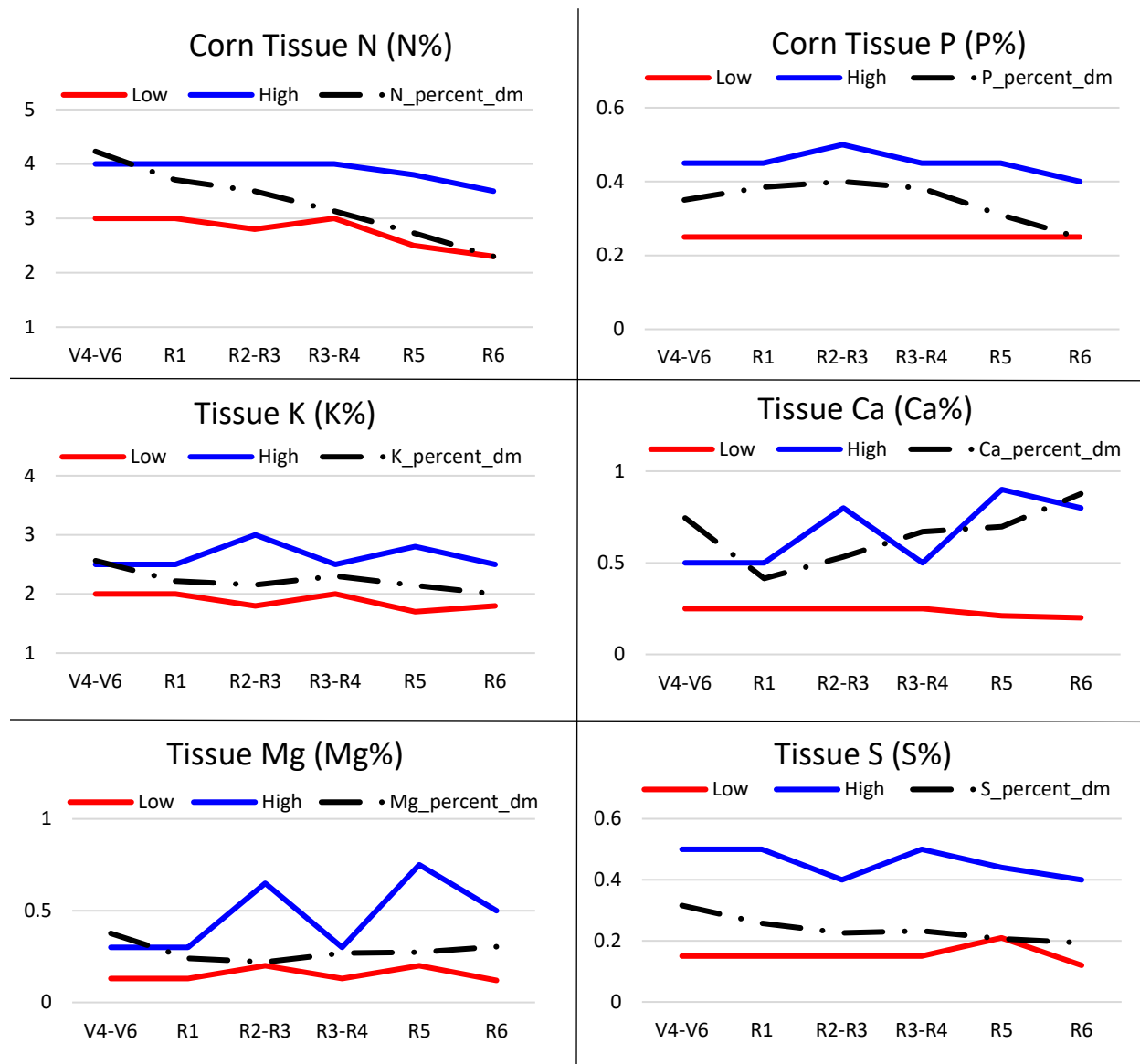
Objective:

This year, with support from the Wabash Heartland Innovation Network (WHIN) grant, we piloted a tissue sampling program to gather data to both help WHIN farmers understand the effects of their demonstrations and assist in creating a data pool for future use in our educational endeavors. We had three growers participate and sampled two soybean and six corn fields.

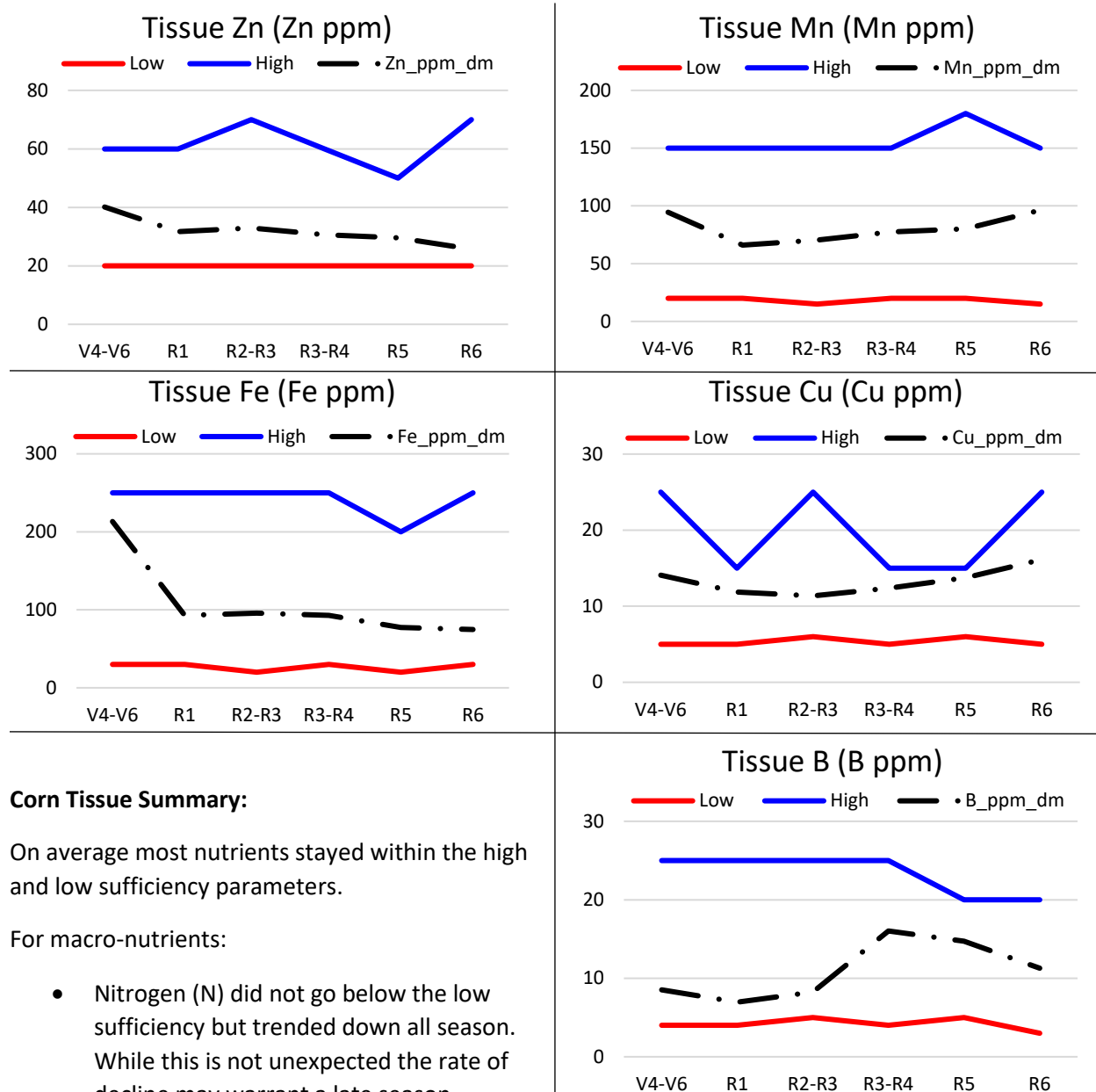
Observations: Average field level tissue results for all growers are shown. Individual results with treatments separated were shared growers in-season and as a comprehensive report post-maturity.

Corn Tissue Samples

Macro-nutrients:



Micro-nutrients:



Corn Tissue Summary:

On average most nutrients stayed within the high and low sufficiency parameters.

For macro-nutrients:

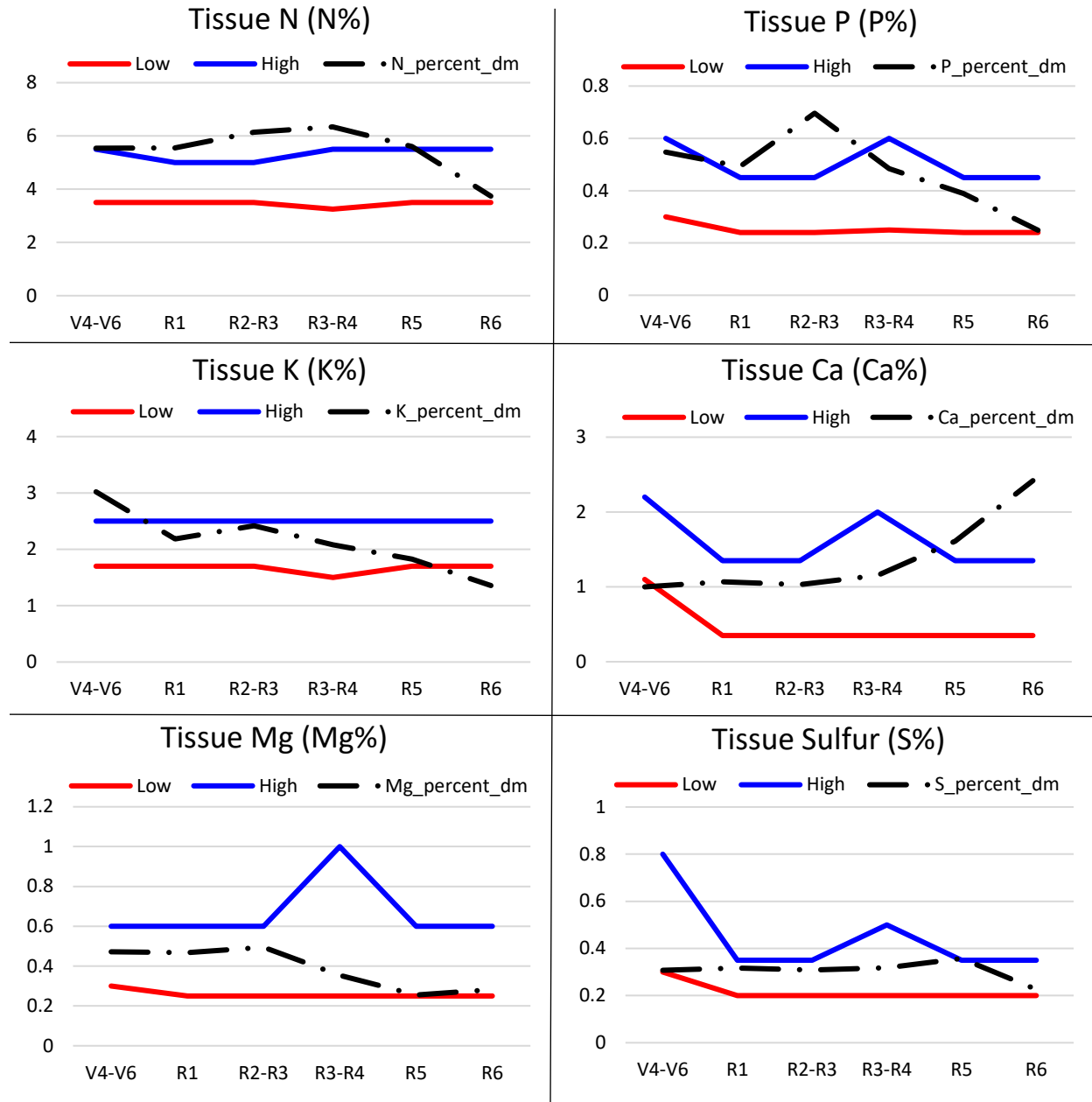
- Nitrogen (N) did not go below the low sufficiency but trended down all season. While this is not unexpected the rate of decline may warrant a late season treatment in some instances.
- Sulfur (S) tended to run low as well by late season.

For micro-nutrients:

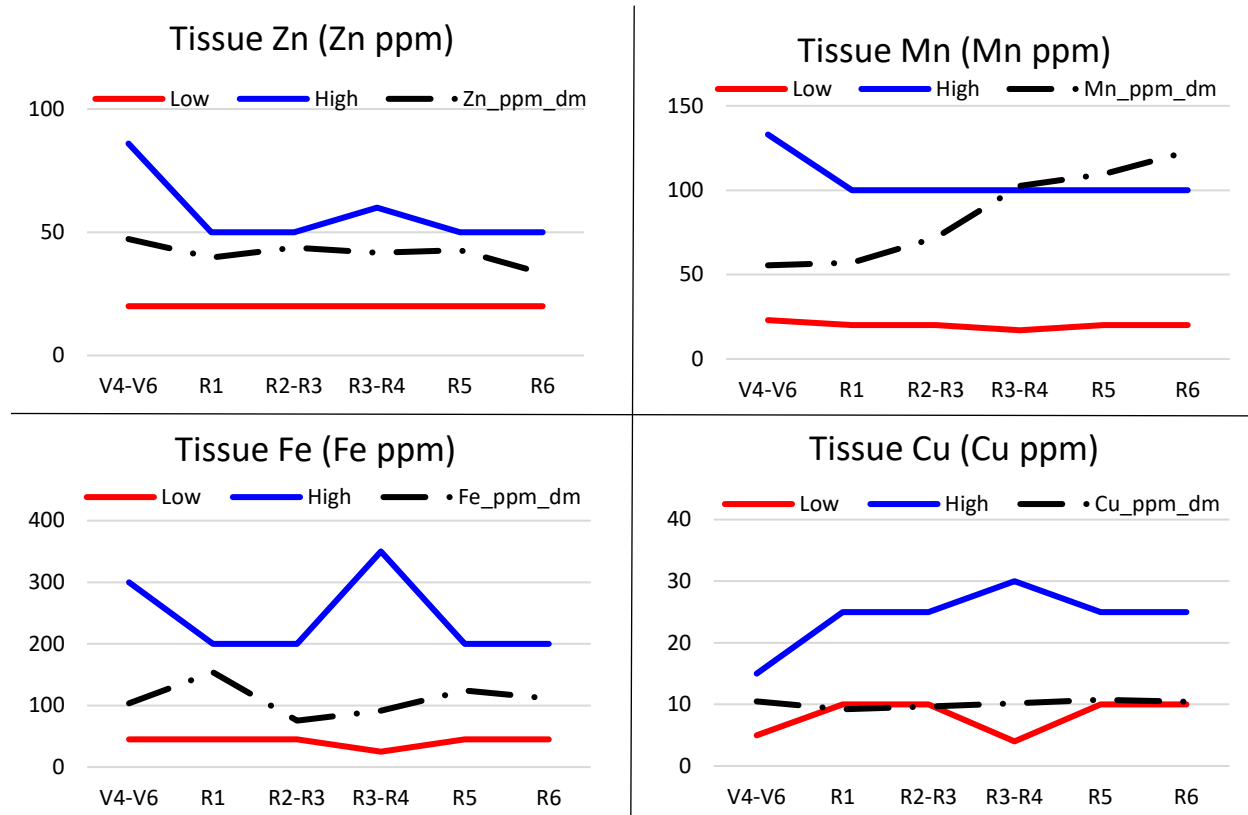
- All micro-nutrients stayed within acceptable parameters.
- Zinc (Zn) alone was trending down numerically when averaged across all fields and treatments.

Soybean Tissue Samples

Macro-nutrients:



Macro-nutrients:



Soybean Tissue Summary:

On average most nutrients stayed within the high and low sufficiency parameters or were in high.

For macro-nutrients:

- Nitrogen (N) dropped off severely after R5, likely due to reduced biological fixation coupled with leaf remobilization to the developing seeds.
- Phosphorus (P) and Potassium (K) were running out by the end of the season with K becoming deficient.
- Magnesium and Sulfur both trended lower later in the season.

For micro-nutrients:

- Copper (Cu) was consistently trending toward low.
- Besides Copper (Cu) all other nutrients were acceptable to high on average.

